



HANDBOOK

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U.S. Army and U.S. Marine Corps
Tactics, Techniques, and Procedures for
Stability Operations
and
Support Operations
(SOSO)

A silhouette of a soldier in profile, facing right, holding a machine gun. The soldier is positioned in the lower half of the cover, with the machine gun extending towards the right. The background is a dark, smoky or hazy environment.

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FOREWORD

The Center for Army Lessons Learned assembled a Combined Arms Assessment Team (CAAT) to collect specific stability and support lessons and tactics, techniques, and procedures (TTP) to help meet the challenges in post-war Iraq. The CAAT was composed of Army and Marine Corps officers and DA civilians considered specialists in areas relative to the hazards presented by the current situation in Southwest Asia.

This handbook is the result of that effort. It contains information derived from recent operations in Bosnia and Kosovo, combat operations in Enduring Freedom and Iraqi Freedom, and lessons and experiences gleaned from our allies. The handbook is a quick-reference guide designed to provide leaders and soldiers with TTP on how to conduct stability operations and support operations on site, at a roadblock or checkpoint, or prior to conducting an arrest of a suspect.

MICHAEL A. HIEMSTRA

COL, FA

Director, Center for Army Lessons Learned

STABILITY OPERATIONS AND SUPPORT OPERATIONS (SOSO)

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The intent of CALL publications is to share knowledge, support discussion, and impart lessons and information in an expeditious manner. This CALL publication is not a doctrinal product. The tactics, techniques, and procedures (TTP) observed and reported in this publication are written by soldiers for soldiers. If you have, or your unit has, identified other relevant TTP for the U.S. Army, contact the Managing Editor, Mr. George Mordica, at com1 (913) 684-9503 or DSN 552-9503. Email address is mordicag@leavenworth.army.mil.

Unless otherwise stated, whenever the masculine or feminine gender is used, both are intended.

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INTRODUCTION

"There is another type of warfare — new in its intensity, ancient in its origin — war by guerrillas, subversives, insurgents, assassins; war by ambush instead of by combat, by infiltration instead of aggression, seeking victory by eroding and exhausting the enemy instead of engaging him . . . It preys on unrest . . ."

John F. Kennedy's Address to the Graduating Class,
U.S. Naval Academy, 6 June 1962

One of the key issues shaping the war in Iraq was the ability of U.S. and British forces to adapt to a combination of classic maneuver and asymmetric warfare. In practice, U.S. forces responded quickly and effectively to Iraqi tactics, whether in the form of covert mine warfare attempts, dealing with raids by "technicals," preventing suicide attacks, and coping with urban stay behinds and dichards, to peacemaking and peacekeeping roles. The US and UK benefited from the lack of large numbers of dedicated irregulars and martyrs, but still demonstrated that they could adapt tactics and force postures to new and surprising uses of asymmetric warfare.

The purpose of this publication is to identify those unit initiatives that worked and promulgate those tactics, techniques, and procedures to the remainder of the force already in country and those readying for deployment. The Iraqi military presented a new range of diversified threat that encompassed forces using lower technology to the potential of weapons of mass destruction, including chemical and biological warfare. The Army is now operating in a new operational environment that stretches combat power in ways we have not encountered nor confronted in the past. Operation Iraqi Freedom truly challenged soldiers and leaders to protect themselves from various and unpredictable threats.

All tactical operations in a desert environment require constant assessment and consideration of four critical assets. Those are *ammunition, weapons, optics, and leadership*. The performance of each of these elements is crucial to successful operations in the Middle East, regardless of the task or mission described in this handbook. Each leader should be aware of the effects of the desert environment on these elements.

CHAPTER 1

TACTICAL OPERATIONS

SECTION I: SNIPER-COUNTERSNIPER OPERATIONS

A. Sniper Employment. Snipers are normally employed in two-man teams, but may be task organized differently at times depending on circumstances faced in a particular stability operations and support operations (SOSO) environment. The team consists of one sniper and one spotter, normally cross-trained to some degree. The spotter carries an M16-series rifle with an optic, the sniper carries the sniper weapon system, and each has a side arm. The team carries additional radios, spotting scope, and appropriate night-vision equipment. The primary mission of the sniper team is to support operations by delivering precision fire at selected targets from concealed positions. The team's fire is characterized by its precision and extended maximum effective range. Precision fire in this context means less than two minutes of angle. The team's secondary mission is gathering information for intelligence purposes. During SOSO the sniper's observation abilities, enhanced optics, and concealed profile can make him a prime source of up-to-the-minute tactical intelligence.

B. SOSO. Most SOSO situations involve necessarily restrictive rules of engagement (ROE). The sniper's ability to discriminate between targets and non-combatants and provide precise fire against fleeting targets while limiting collateral damage make him invaluable to the unit commander. While the advantages of using snipers in an urban SOSO environment are obvious, there are also associated challenges. These operations are often conducted in densely populated urban areas, which heightens the risk of compromise during insertion and extraction and while occupying hides. Also, snipers will often be working in direct support of small units where they do not have a habitual relationship or have not shared standing operating procedures (SOP). Detailed planning and rehearsals are the way to meet these challenges and enjoy the full capability that snipers bring to these operations.

C. Concept of Employment. Employment options fall into two broad categories:

- **Internal Support:** Employing snipers internally simply means from a position co-located with other friendly forces.
- **External Support:** Employing snipers externally uses traditional employment methodology in that the team is operating semi-autonomously, not physically tied in with a larger unit. But even in these cases, in a SOSO environment snipers will often be operating in direct support of and in close physical proximity to other friendly forces, increasing the need for detailed coordination.

During SOSO operations, constant reevaluation of one's position and method of operation is critical to fighting complacency and the establishment of easily understood patterns. This will also be true in the employment of snipers. Creativity and imagination should be used as time goes on to retain the initiative and maximize the value of this asset.

D. Sniper Employment Techniques.

1. Internal Support: This will be the most common method of employment a battalion finds itself in when conducting urban SOSO. The difficulty in clandestinely inserting teams; the high risk of compromise of teams once inserted in a densely populated urban area; and the challenges associated with supporting, reinforcing, or extracting will influence this method. Additionally, in high-threat situations, sniper coverage of infantry and other ground combat units conducting operations will be a high priority. Sniper teams that are often employed in general support of the battalion will often find themselves in direct support of individual rifle companies. The development of habitual support relationships between those teams and the respective companies during pre-deployment training should be part of the scout sniper platoon mission essential task list (METL).

2. Combat Out-Post Support: Companies and platoons will sometimes find themselves occupying a fortified building or a compound with a cluster of small buildings from which they conduct operations. Sniper teams will construct multiple hides around the facility to provide coverage and support the defensive scheme. All hides are not occupied simultaneously, but having them constructed ahead of time gives the commander the ability to rapidly shift teams around. Teams can be moved to different positions periodically as the threat changes. In addition to being fully integrated into the defensive scheme, these teams will be a valuable, steady source of information as the local commander builds a picture of the patterns occurring around his position.

3. Checkpoint Support: The establishment of checkpoints is fundamental to the friendly forces' ability to dominate a given piece of urban terrain during SOSO. Checkpoints will be either deliberate/semi-permanent or hasty/short duration.

- **Deliberate:** Deliberate checkpoints are often established as a force protection measure for a high-value target. Snipers establish a hide position from the best vantage point to provide overwatch for personnel running the checkpoint.

- **Hasty:** Hasty checkpoints are established along lines of communication to interdict the flow of weapons and insurgent/terrorist personnel around the city. These checkpoints will be short in duration in order to maintain an element of surprise and deny the enemy time to plan an attack on the position. The checkpoint may be operated for as little as 30-45 minutes or up to several hours depending on the situation. Insert teams well ahead of time to occupy overwatch positions that provide coverage. Teams should stay in position through the conduct of the checkpoint and cover the withdrawal of the checkpoint force. As with all operations where snipers are directly supporting an adjacent infantry force, it is critical that every soldier and Marine know the location of friendly snipers. In the event of contact, if all personnel are not properly briefed, there is a high risk of fratricide, with the infantry personnel bringing their own sniper positions under fire. This is particularly challenging during SOSO because of the large number of attachments with special skills that units will be task organized with (e.g., explosive ordinance disposal, translators, civil affairs).

4. Dismounted Patrol Coverage: Urban SOSO operations will often be characterized by an aggressive patrolling effort. Due to the nature of the threat and the ROE, snipers will provide to patrols in this environment what artillery and mortars provide in less permissive, more rural settings and require the same level of detailed planning and coordination.

- All sniper positions already located in the vicinity of the patrol route should be identified and briefed on the details of the patrol.
- The patrol leader (PL) will conduct a communications rehearsal with all the identified teams prior to line of departure (LD).
- Teams being positioned specifically to support the patrol (i.e., a team assigned to provide overwatch for a patrol conducting a hasty check point) should be included in the orders process from the beginning.
- During the conduct of the patrol, the PL will maintain communications with all supporting sniper teams. Supporting teams should monitor the patrol's primary tactical net to maintain their situational awareness.
- Again, it is critical that every patrol member be briefed on the location of friendly snipers to mitigate the risk of fratricide in the event of contact.

5. Armed Riots: During SOSO operations, insurgent forces will complicate civil disturbances by using the presence of protesters or rioters to hide within and engage coalition forces. Regardless of whether or not it is technically legal to engage these personnel with nonprecision fires within the ROE (inherent right to self-defense) and specific circumstances, it is never preferable. Collateral damage to unarmed personnel will only undermine friendly efforts and build support for insurgents, ultimately resulting in greater coalition casualties.

- Snipers should be positioned high and to the flanks and rear of the force assigned to deal with the civil disturbance.
- Teams should be assigned mutually supporting sectors that cover the area of the riot.
- Because of the large, chaotic nature of activity taking place in the team's sector and the requirement that they identify legitimate targets within it, the sniper and spotter will become completely absorbed in the target discrimination process. This may require the addition of a third or even fourth member to the team to maintain security and situational awareness on what is taking place to the flanks and rear and to communicate with higher and adjacent units.

6. Cordon and Search (C&S) Operations: Sniper employment in support of C&S operations will in many ways resemble support for checkpoint operations. To support a C&S, the team or teams should be inserted at least 24 hours prior to execution to gain observation on the target. Teams will be given the mission of providing precision fires onto the target to support the C&S force or to cover the force from an external threat, but never both.

7. External Support: External support may be either direct support to an individual rifle company or in general support of the battalion. These operations are characterized by the physical isolation of the team in a densely populated urban area that is semi-permissive. It will involve extensive planning for insertion and extraction of the team as well as solid intelligence on their target. To justify the extensive effort, commitment of resources (sniper teams that will not be available to support other operations), and risk, there will have to be detailed, timely intelligence that will indicate a high probability of success. Such operations have the advantage of a very "low signature" that may be appealing under certain operational circumstances. Under the right circumstances, the high gain of such missions will justify the commitment of resources and should not be dismissed because of an ingrained aversion to risk.

8. Insertion Techniques: This is extremely challenging in a densely populated urban area. The local commander should strive to be imaginative in order to meet the challenge and remain unpredictable. The most common method is the “stay behind” technique or a variation of it. If there is an aggressive, ongoing patrolling effort, the local population will become desensitized to the presence of patrols. A high volume of patrols makes it very difficult for the insurgent elements to monitor; therefore, the local commander should use these patrols as the vehicle for sniper team insertion and extraction. Simply embed the team within a security patrol. At a designated point along the patrol route, the patrol leader will call for a long security halt. The sniper team moves to a position of cover; the patrol resumes its movement. Once the team confirms it has not been observed, it moves to its designated position and establishes the hide. To extract teams, the same method can be used. Linkup (L/U) occurs at a pre-designated spot, made to look like a normal security halt to the untrained eye. The team melts into the patrol, and the patrol completes movement along the route.

9. Precision Ambush: Because of the nature of the enemy and restrictive ROE, using traditional ambush techniques will be rare. Insurgent elements may operate individually or in pairs in densely populated areas, making a squad or platoon the wrong tool to deal with the insurgents. Also, because of the “high signature” that even a light platoon would have in a densely populated urban area, the chance of maintaining the element of surprise (critical to any ambush) is minimal. If, however, the local commander has accurate and timely intelligence, snipers can be used as the ambushing element.

- Multiple teams are inserted in the vicinity of the ambush site using some variation of the stay-behind method.
- Because of the requirement to coordinate between multiple teams and a QRF, a small command element will be inserted and co-located with one of the teams.
- A quick-reaction force (QRF) will be established and moved to an attack position close enough to allow them to maneuver quickly to the ambush site, but far enough away so as not to arouse suspicion.
- After initiation of the ambush, the QRF will maneuver to cut off escape and sweep the ambush site.
- Extraction of the teams can occur at that time or later if there is some advantage to keeping them in place until after the QRF departs. The risk of compromise to the teams will increase after the ambush is conducted because it will normally stir up activity among the local population. This should be factored into the decision.

10. Overt Sniper OP: Stealth is a key feature of most sniper operations. As stated in the mission, they provide precision fires from concealed positions. Depending on the particular circumstances of a given SOSO situation, the commander may want to consider other employment options. One option is the establishment of overt sniper observation posts within the area of operations (AO). Sacrificing stealth has some obvious disadvantages, but also many advantages. The commander must weigh these and consider the specific nature of the enemy threat to determine whether this technique is applicable. Hardened positions located between key terrain that dominate a given piece of complex terrain may be ideal. These positions give the commander —

- Continuous observation of critical areas within the city.
- Overwatch and precision fire support dismounted patrols.

- A deterrent for the enemy by denying or obstructing his ability to operate freely in areas covered by the position.
- The ability to provide continuous overwatch for company or platoon positions within the area.
- The ability to deny access to this key terrain to enemy forces.

The position will include multiple teams to allow for 24-hour operations as well as a squad for security. Additional advantages to an overt posture is that it can be resupplied at will, reinforcement/deployment of the QRF can be rehearsed, and it alleviates the sometimes crushing requirement of constantly inserting and extracting teams.

11. Urban Suppression of Enemy Air Defenses (SEAD): The vulnerability of rotary-wing aircraft to rockets and small arms during urban operations restricts the ability to use this asset during SOSO. The nature of the opponent and the ROE neutralize many of the tools normally used to conduct SEAD. However, there may be tactical circumstances that make the use of rotary-wing aircraft appealing (i.e., wanting to periodically insert or extract a patrol by helicopter to break up the routine and keep the enemy off balance). A task-organized force of sniper teams acting in coordination with the escort aircraft can provide a limited SEAD capability. This would involve the following:

- Close coordination between the patrol leader, the air mission commander, and the sniper task force leader.
 - Infiltrating teams to pre-determined positions around the designated LZ and establishing mutually supporting hides.
 - Marking positions for the escort aircraft (IR devices, air panels on roofs).
 - Tasking the sniper TF to determine the status of the LZ (hot/cold) and marking it.
- (This depends on the risk to the teams of compromise.)

Upon completion of the insert, linkup with the inserted force takes place per the order, and the sniper TF is subsumed within the inserted force.

12. Planning Considerations: Company and platoon commanders that have snipers supporting their operations must plan for them. The employment of snipers requires a high degree of detailed planning and coordination. Many infantry company commanders do not routinely train with snipers. Following are some items to consider during planning.

- Develop a detailed insertion/extraction plan.
- Discuss actions if compromised during all phases of the mission. Discuss different types of compromise (hard vs soft) and how each will be handled.
- Ensure the communication architecture for the operation supports the scheme of maneuver. Insist on a detailed communication rehearsal.
- Develop a detailed "no communication" plan. The plan should be based on hard times (i.e., if you miss two consecutive hourly comm checks, proceed to the extract rally point) vice time periods (i.e., "no communications for two hours" — When did the two hours start?).
- Extract plans must be realistic. Include the QRF commander in the sniper emergency extract planning. Include a detailed linkup plan in the event the unit is in contact.
- Departure and re-entry of friendly lines.

- Ensure sniper familiarity with patrol battle drills if being inserted or extracted using the "stay-behind" method.

The best way to mitigate the risks for sniper operations is effective detailed planning. Trust the sniper team leaders and solicit their input.

E. Counter-Sniper Operations.

"The enemy sniper fears the countersniper who is better trained and equipped with a more accurate rifle that has a flatter trajectory and longer range....However, his worse nightmare is being hunted by a sniper who has better planning, support, coordination, and integrated mutually supporting countersniper teams and patrols...."
—LTC Michael R. Harris, U.S. Army, Retired (*Infantry Magazine*, Nov-Dec 95)

1. The Threat: The effectiveness of an enemy sniper is measured by more than casualties or destroyed targets. Commanders know that snipers also affect friendly activities, morale, and decisions. Knowing snipers are present hinders movement, creates confusion and continuous personal fear, disrupts operations and preparations, and compels the commander to divert forces to deal with the snipers. Sniper fire accounts for many of the casualties during peacekeeping and stability operations.

2. Enemy Snipers and Their Capabilities: The three general types of snipers are the specially trained and equipped individual, the trained marksman, and the civilian irregular. Each has different characteristics of operation and may be used to accomplish different purposes. Countermeasures effective against one type may be less effective against another.

- **Specially Trained Sniper:** The most dangerous sniper is the individual who has been specially selected, trained, and equipped with a modern scope-mounted sniper rifle. These individuals are expert shots and are trained to select key individuals as their targets. They can hit at great range (sometimes out to 1,000 meters), and are skilled in avoiding detection. These individuals are extremely rare in an irregular insurgent force.

- **Trained Marksman:** A trained marksman is a common sniper often found in urban combat. This sniper is a trained soldier, equipped with a standard issue weapon, who is an above-average shot. He normally has fair to good field craft skills and is difficult to detect in the urban environment. He may be employed individually or in teams to create confusion among friendly forces, cause casualties, or harass and disrupt the tempo of operations. The trained marksman is a dangerous foe.

- **Armed Irregular:** The third general type of sniper is the armed irregular. He may have little or no formal military training, but may have experience in urban combat. He may or may not carry his weapon openly, and may go to great lengths to avoid identification as a sniper. His fires are normally not accurate, and he seldom deliberately targets specific individuals.

3. Range of Sniper Attacks: The typical range for a sniper attack is 300 to 600 meters with medium-caliber rifles. Shots from 800 to 1,000 meters are the exception. Heavy sniper rifles (caliber .50, 12.7-mm, 14.5-mm, and 15-mm) with ranges of 1,200 to 1,500 meters are now available around the world. These heavy sniper rifles are only marginally accurate enough for long-range shots against individual personnel. It is their ability to shoot through all but the heaviest shielding material, and their devastating effects, that make them valuable psychological weapons. The bullet from a sniper's high-power rifle passes easily through lumber and concrete blocks. During urban SOSO, enemy snipers will often use the civilian population as cover and attempt to use our ROE against us.

4. Recommended Actions to Defeat Enemy Snipers: Units can take fundamental tactical precautions to minimize the threat of snipers. Below are some proven methods that, when implemented collectively, will minimize the effects a sniper can have on tactical and base camp operations.

- Hang blankets/covers over windows to protect individuals inside.
- Maintain a large number of OPs. To be effective, a sniper must get into a firing position without detection. Establishing OPs and briefing observers to watch for anyone with a weapon; pointing out obvious positions a sniper may fire from; and making sure that each OP is equipped with binoculars, NVDs, and thermal sights (when available) so that they have 24-hour capability helps reduce the chance of an enemy sniper working into position.
 - A hand-held illuminator in combination with a night-vision device (LPC 30 with PVS 4B or PVS 7B) will illuminate sniper optics.
 - Construct barriers and shields around checkpoints and OPs to protect soldiers. Shields and screens can be used in cantonment areas to block a sniper's vision as he scans for targets.
 - Clear and occupy all buildings around checkpoints and OPs to eliminate potential sniper positions.
 - Maintain active patrols. Active patrols should be maintained especially in areas covering OP dead space. These patrols should not only watch for obvious armed personnel, but also evidence that people have moved into or fired from positions.
 - Do not establish obvious routines. These would include holding formations at standard times, issuing equipment or rations in a manner that causes soldiers to line up for extended periods, and grouping large portions of the chain of command in one area. Other helpful actions include not saluting, removing rank insignia, camouflaging, and operating during limited visibility conditions.
- Engage the enemy sniper. The best weapon to use against an enemy sniper in SOSO is another sniper. That said, friendly snipers are not always present at the site of an enemy sniper attack. The first and last rule of engaging the enemy is to use maximum force against the sniper. This must be balanced against collateral damage considerations. The intent of the attack may be to goad the friendly force into overreacting and inflicting noncombatant casualties. Next, coordinate different aspects of defense. OPs, patrols, ambushes, friendly snipers, fire support, close air support, and deception measures should all be brought together at the moment that the enemy sniper is spotted, either in his position or moving into or out of position.
 - Once spotted, the enemy sniper must be forced to surrender or be killed. Allowing the enemy sniper to fight another day is mission failure.
 - Weapons not normally considered as countersniper ones should definitely be thought about as such. MK 19 grenade launchers, Dragons, or TOW (especially if there is no anti-armor

threat), and caliber .50 machine-guns in single-shot mode allow U.S. forces to out range the enemy sniper.

- The use of friendly armor to maneuver against an enemy sniper neutralizes his lethality.
- Military police, local police, or infantry can be used to cordon off the sniper's kill zone and areas around his suspected position to limit casualties. As soon as contact is made, the on-scene commander must be thinking how to "go deep" by rapidly maneuvering friendly forces behind the sniper's location to cut off escape.
- Helicopters can be used to keep surveillance over the area suspected to be occupied by the sniper and deny him movement along rooftops.
- The TOW, HELLFIRE, 30-mm cannon, and other helicopter-mounted weapons should be considered as countersniper weapons.

5. Reaction to Enemy Sniper Fire:

- **SOSO unique:** During SOSO operations in a semi-permissive, densely populated urban environment, the techniques used to react to a sniper in a higher threat environment will almost never be effective against the sniper, but will cause substantial casualties among non-combatants, increasing support for enemy forces, and ultimately resulting in greater friendly casualties. The use of a "mad moment" or "recon by fire" will likely cause substantial collateral damage while increasing confusion and increasing the likelihood that the enemy sniper can successfully escape.

- **Going Deep:** "Going deep" is a slang term that refers to the technique of rapidly locating, fixing, and maneuvering behind an active enemy sniper in order to ultimately kill or capture him. How this is done is completely situation dependent. When contact is made, the on-scene commander needs to rapidly calculate the disposition of his forces, the QRF, and adjacent friendly forces, and factor in time/space considerations to determine how to neutralize the threat. Because of the fleeting nature of the threat, it is often preferable for the on-scene commander to begin to maneuver against the hostile sniper with an unengaged portion of his own force vice waiting for a QRF.

- **Confirm that the enemy sniper is dead.** This step is necessary so that forces committed to the operation can be released, and to ensure that the enemy is not going to return at some future date to disrupt operations or cause more casualties. Even a dead enemy sniper can be a valuable source of intelligence.

6. Emerging Technologies: There are a number of new and emerging technologies that will both aid the sniper in the conduct of his mission and assist the local commander in countering enemy snipers as he conducts urban SOSO. Some examples are:

- **Thermal Screens:** These are screens similar to cheese cloth that aid the sniper in the construction of an urban hide. The screen is shaded light and dark on opposite sides, giving the team the option to use the side that will best mask their position depending on the surroundings. The screen is mounted to cover the window masking the snipers; they can see and fire through it. Additionally, now the material in these screens suppresses the thermal signature of the snipers that can be seen from outside.

- **Acoustic/Muzzle Flash Detection Devices:** There are a number of emerging technologies that show great promise at being able to aid forces in identifying the location of enemy snipers. They fall into two broad categories: those that use the acoustic signature of the sniper shot to determine location and those that use the muzzle flash. Prior to fielding, these capabilities must be further refined and miniaturized.

SECTION II - DEVELOPING SITUATIONAL UNDERSTANDING

Collecting and Processing Tactical Information

A. Introduction. Stability operations and support operations (SOSO) is a common entry point for conventional forces into the new world of asymmetric warfare. In the contemporary operational environment (COE), America's adversaries are attempting to take our overwhelming conventional strengths and turn them into crippling weaknesses. Superior technology, firepower, and mobility — those things that on the conventional battlefield give us amazing strength — themselves become the targets of our enemies. Additionally, our foes attempt to seize upon the presence of the media and the natural American concern for troop welfare by conducting attacks that impact domestic support. Actions to preserve our conventional strength, protect our forces, and facilitate the rapid transition from the defense to the offense must be taken.

In SOSO, our units suffer from a disadvantage in situational understanding. The enemy has an immediate tactical understanding of the battlespace. It is his home and he has spent years studying it. The high signature (i.e., obvious presence) of our forces facilitates the enemy's targeting effort. In contrast, his low signature enables him to conceal his location and movement and to gather intelligence from sympathetic or unwitting members of his own culture. So long as our units lack situational understanding, mission accomplishment in SOSO will be difficult. Such ignorance may lead to mission failure.

Situational understanding is gained through a constant, relentless, and thorough process of educating every member of the unit about the battlespace in which he operates. This education is gained through a combination of tactical actions that span the spectrum of operations — from civil affairs to security patrols to open combat. The experiences and information gained through the execution of all these operations increases understanding of the battlespace. The actions suggested in this section are intended to enable small unit leaders to better understand their battlespace.

B. Collecting Tactical Information. Tactical information facilitates tactical operations. The battlespace is full of information. Much of it is useful and helps the unit to develop situational understanding. But much of it is also useless noise and can overwhelm the unit leader. To successfully develop situational understanding, the unit leader must use methods that systematically screen out useless information and enable him to focus on pertinent data.

C. Vigilance. In SOSO, the soldier's primary tool is not his weapon, but his mind and the ability to remain alert on and off duty. The unit leader must take actions to increase his unit's vigilance. Suggested actions are:

- Frequent visits to all static posts to observe soldiers' actions and make on-site corrections to deficiencies in security procedures and alertness levels.

- Quizzing the soldiers about their assigned sectors. Ask them questions about houses, vehicles, and individuals within their sector. Soldiers who demonstrate a familiarity with the routine of life within his sector are demonstrating vigilance. Ask the soldier about recent changes to the routine. If different squads, patrols, or platoons are rotated through the sector, ask the soldier what he was briefed during the relief-in-place.

- Task patrols and OPs with specific questions to answer during their patrols or watch shifts. During debriefing, the patrol or watch standers should provide answers to these questions. Care should be taken not to levy questions that are too general such as, "How were things in town today?" Nor should a single OP or patrol be given too many questions to answer. The following example is a suggested collection task: "Today you will be patrolling through the Shaheed Masoud neighborhood along Mansour Street. Note the buildings on all four corners of the intersection of Mansour Street and Jalal Street, and provide details on their height and the number of street front windows and entrances." Over time, as more of these questions are asked and answered, the unit leader will be able to develop a very detailed picture of the assigned sector in his headquarters or patrol base. This information will aid in the planning and execution of operations within his sector.

D. Engaging the Locals. Situational understanding is not developed by passively observing the activities within the sector. An important part of the education is getting to know the local populace in detail. Professional interaction with the populace not only helps to communicate the purpose for being there and to gain support, but also to provide information to achieve mission objectives. Significant efforts should be made by leaders at all levels to make contact with the local populace. Regular meetings between company commanders and local neighborhood or village leaders should be held. Keep in mind that even a less than supportive local can provide useful information.

A variety of sources can confirm the veracity of information collected. The use of linguists and/or trained interrogators (based on availability of resources and coordination of Army/joint assets) is highly encouraged, but the use of phrase cards or electronic language translation devices are also useful for interaction on patrols or at OPs and checkpoints. Care must be taken to ensure that the interaction is culturally appropriate. For example, it is unacceptable in some cultures for males to address females who are not related to them. In any event, the local populace can be a significant asset if a relationship can be established.

E. Tactical Interrogation. Civilians and captured enemy combatants hold a wealth of information that is useful to the small unit leader. Due to the rapid tempo of operations, however, the usefulness of this information is highly perishable and fleeting. Tactical interrogation of these individuals allows the unit leader to glean those pieces of information that can be critical to success. Trained interrogators are a low-density asset that may not be available for support to the tactical commander. The small unit leader should review the records of his personnel to identify individuals who have proficiency in foreign languages and have them tested to determine their true capability. Larger commands may offer survival-level language training. Leaders should take advantage of these opportunities and request mission-oriented language training that will enable his unit to collect basic facts related to his mission.

F. Recording Information. No soldier can remember everything that happens on a daily basis, much less weekly or monthly. To capture important information, the unit must have a record of what has occurred in the area of responsibility (AOR).

- **Patrol Logs:** Each patrol leader should maintain a written record of events during his patrol. This record should include any noticed changes to the environment in the sector patrolled, when this information was reported to higher headquarters (the TOC or the patrol base), and any information gathered from locals during the patrol, if any. If a patrol log is too difficult to write during a patrol, then the patrol leader can use a voice recorder. The use of small video devices may also be helpful in recording information, depending on the situation. Many current video cameras come with a built-in screen that is sufficient for reviewing the video clips. Many also have a still photograph mode. The video and still photography are useful tools during a relief-in-place in bringing the relieving unit up to date on activities in the assigned sector.

- **Company, Platoon, or Patrol Base Logs:** The maintenance of journals is a standard procedure in battalion TOCs. Smaller units, such as squads or platoons, should also keep logs of all events that occur in their sectors. If a company or platoon has OPs or patrols running from a central headquarters, then both the OPs and patrols should have logs, as well as the headquarters. These headquarters' logs should contain a record of all transmissions from OPs or patrols in the sector, as well as information regarding the situation passed down from higher headquarters or from adjacent units. When the headquarters' logs and patrol/OP logs are set side by side, they should provide a clear picture of significant events that take place in a certain sector over a period of time.

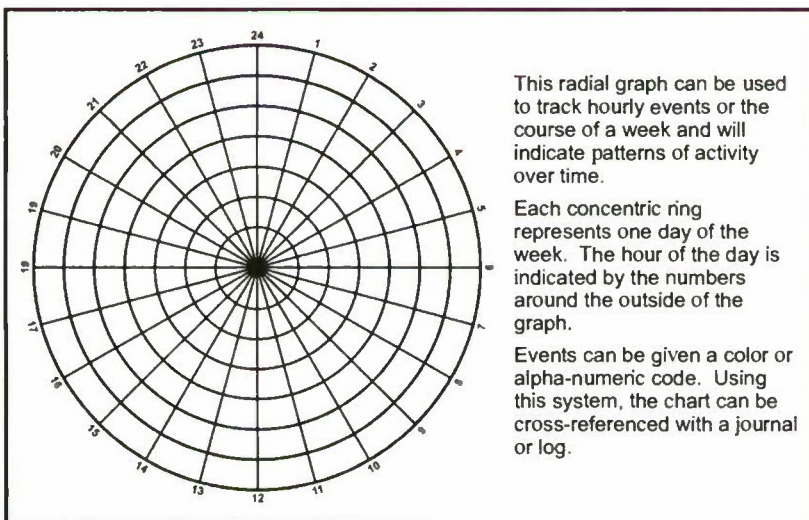
G. Analyzing Information. Recording events is not sufficient to give the unit leader a solid understanding of what is occurring around him. The information must be analyzed to identify any trends that stand out. By doing this analysis, the leader will do two important tasks: He will educate himself and his soldiers over time on the characteristics of his sector, learning the rhythm of the community, if any, and get to know the locals that live in that area. Second, due to this increased understanding, he will then be able to notice unusual patterns that may be indicators of activity, such as surveillance, smuggling, or guerrilla attack.

- **Operational Debriefing:** The unit leader must see to it that a thorough debriefing of all patrols, OPs, and tactical actions is conducted. This is more than an after-action review (AAR). Good debriefs include not only friendly actions and recommendations for improved TTPs, but also a review of the information collected on the sector itself. Debriefings are thought to be difficult and time intensive. This may be true in the early stages of operations in the assigned sector. As the soldiers become familiar with the area, however, much of the information on the terrain and people will be briefed only by exception. The unit leader conducts the debriefing for the benefit of his unit, but he may find it helpful to request or invite a representative from the battalion S2 to attend or perhaps even assist. Higher headquarters may bring with them information that gives better context to events occurring with the company or platoon's sector. Debriefs should occur immediately after the patrol is completed or the watch is rotated.

- **Identifying Patterns:** Once the information is recorded by the leaders and debriefed regularly, the next task is to identify patterns in the sector. The pattern of events in all societies

is generally cyclical. Days, weeks, months, and years bring with them specific events that take place at regular intervals. Leader and soldier alike must learn these patterns. Knowing these patterns will be key to both operational planning (When is the best time to conduct a cordon and search operation in my sector?) and surveillance detection (Why is this new car parked across from our compound everyday at 0800 all of the sudden?). The following are two suggested tools to track patterns:

- * **Calendars:** An excellent way to track these patterns is to use a blank daily and weekly calendar. In the beginning of operations in an assigned sector, each platoon commander, patrol leader, and OP should keep a calendar with the events of the local area that are observed. After the first couple of weeks, these can be consolidated into a single unit calendar to be kept in the company/platoon headquarters or patrol base. Higher headquarters can provide information on exceptional events, such as holidays and important anniversaries, when demonstrations or riots are likely to occur. Leaders can consult this calendar when planning patrols or other operations.
- * **Radial Daily Activity Chart:** This chart consists of a radial graph divided into 24 sections — one for each hour of the day. This tool is used to track the daily events in the sector, such as rush hour, daily religious observances, and dry goods delivery. The following figure shows an example of a simple radial graph for plotting and tracking hourly activities over the course of a week.



H. Using Information. Building situational understanding is not an end in itself. The purpose of collecting and analyzing tactical information is to enable the small unit leader to act decisively and effectively. There are two classes of information: actionable information and background information. Actionable information requires some action on the unit leader's part. This action can range from dispatching a patrol to gather more information to conducting a raid on a suspected weapon's cache to merely passing news on an event in the sector to higher headquarters. Background information does not require any action, but is useful for understanding the surroundings in depth. An example of background information is a sketch of a neighborhood layout with the name of each family written on each house or a list of vehicles commonly seen in the sector. This information may be important in the future, but requires no specific action by the unit leader.

I. Indicators of Surveillance Activity. Reconnaissance is a part of any sophisticated military activity. This applies to terrorists and guerrillas, as well. The enemy conducts surveillance and reconnaissance to select the target he will attack and again to gather detailed information on the selected target to increase the likelihood of success. Thankfully, the enemy is vulnerable to observation by friendly units when he does this. In fact, this will likely be the only opportunity during SOSO to go on the offensive against the enemy. When a terrorist or guerrilla strikes, friendly units are required to react to the attack. Reaction is an inherently defensive activity. It is normally said that defeat can be prevented by the defense, and the offense is the only way to victory. In asymmetric warfare, even a successful defense cannot stave off defeat. The enemy, by the sheer audacity and violence of his attempt, may impact political and popular support for the mission. Therefore, the small unit leader has a strategic responsibility in the asymmetric fight to attempt to identify surveillance activity. All indicators of surveillance activity is actionable information. It must be passed along to higher headquarters and may even require counter-surveillance measures in order to spoil or disrupt the enemy's ability to collect target information. It can be difficult to spot surveillance activity in the urban environment. This is why detailed situational understanding is so critical. The better educated all members of the unit are in the characteristics of the sector, the better able they will be to notice activity that is out of the ordinary and perhaps an indicator of surveillance. Surveillance is often detected only after collecting the information from multiple observers in the unit and comparing reports in thorough debriefing sessions.

Some common indicators of surveillance activity are:

- The repeated presence of new persons or vehicles in the sector, particularly around times of regularly scheduled friendly activities such as supply deliveries.
- Reports from the locals of persons from outside the sector/neighborhood asking questions regarding friendly units.
- Spontaneous confrontations with patrols or at checkpoints. Guerrillas/terrorists often conduct "dry-runs" on friendly units to determine reaction times and procedures.
- The "accidental" presence of host nation workers in restricted areas of a friendly compound. Personnel may use excuses such as, "I got lost while going to the bathroom."

SECTION III: SMALL UNIT URBAN OPERATIONS TTPs

A. General Tips.

- Direct-fire control measures are essential for mission success and reduction of fratricide. Target reference points should be known physical locations and visible from different locations (e.g., church steeples and radio towers).
- Assault squad/team leaders must maintain patience and allow conditions to be established before committing their element. Allow the support to get set. If used, allow smoke to billow prior to movement.
- For riflemen and team leaders, village and street fighting requires units to seize a foothold in a given building and clear individual rooms.
 - * At the squad level, the fight is normally for a floor or a single-story small building.
 - * The company and platoon fight revolves around larger buildings.
 - * There are three weapons systems that cause almost all casualties among units in urban operations: mines and booby traps, indirect fire, and direct fire from small arms. Like a wooded area, objectives in urban areas should be attacked from the flank and rear.
 - * Maintain tactical light discipline! Under no circumstance should a TAC light go off outside a building.
 - * Squad leaders must know how to call for fire. (Often squad leaders do not know how to call for fire or how to describe what target they are observing.)
 - * After entering an urban area, a strong point should be established with 360-degree security. From the strong point, squads can clear adjacent buildings or rooms. Once adjacent areas are cleared, the platoon can set conditions for the next advance.
 - * A tank round fired into a building will either destroy or neutralize the enemy. It will facilitate the rapid advance of infantry forces into a room or building. Direct-fire control measures are mandatory to prevent fratricide.
 - * When possible, do not skip any buildings or rooms. Use markers that are visible day and night (VS-17 panels/chemical lights) to mark cleared rooms and buildings.
 - * To gain a first foothold in a town, use smoke, engineers, and tanks supported by infantry. The combined arms team is the most effective method of establishing a foothold and conducting offensive operations in an urban environment.
 - * Black mesh screens, preferably constructed of thermal reduction material, can be used to cover windows to conceal the room's contents. Snipers and observers can use this for concealment. Elements must be vigilant when checking windows.

B. Boundaries Between Units. Place boundaries along the faces of buildings and not down the center of streets. Ensure responsibility of streets and roadways falls to a specific unit. Leaders must coordinate these responsibilities during adjacent unit coordination.

C. Zones of Unit Action. Each platoon or squad should be assigned a definite zone or group of buildings within the city block under attack. The city block may be thought of as a hollow square

outlined by buildings. When the buildings on the near side of such a square are already held, one unit (squad or platoon) should be assigned to clear the buildings on each of the two sides (right and left). A third unit remains on the friendly side to give support by firing across the center of the square into the rear windows and back entrances of enemy-held buildings.

D. Routes of Advance. Most casualties are sustained moving down streets in urban terrain. Breaching of interior walls by mechanical, ballistic, or explosives between buildings provides an alternate avenue of approach when mission, enemy, time, terrain, troops available, and civilian considerations (METT-TC) and rules of engagement (ROE) allow these techniques. Hallways, stairways, rooftops, and basements are used as routes of advance. When METT-TC and ROE dictate, bulldozers may be used to provide alternate routes of advance by dropping buildings.

E. Crossing Streets. It is best to cross streets near the center of blocks; intersections have a higher probability of engagement by threat forces. Prior to crossing, elements must establish support-by-fire positions with sectors designated. The street is then screened with smoke grenades so that the soldiers can dash across the street. If the smoke is drawing indiscriminate fires, then additional smoke on flanks can be employed for deception. Elements must maintain dispersion during street crossing.

F. Land Navigation in an Urban Environment. Conventional land navigation techniques using the compass, global positioning system (GPS), and map are degraded in an urban environment. Compass and GPS are often degraded due to the buildings and infrastructure in an urban environment. Standard military maps do not have adequate detail for urban operations.

- Aerial photographs, sketch maps, or tourist maps with an overlaid military grid reference system will facilitate higher headquarters' situational understanding. These maps must be copied and distributed to all, including air assets providing CAS.

- If not developed by higher headquarters, the small unit must number all buildings and name all streets within the area of operation to facilitate a command operational picture for all small units and individual soldiers. In addition, these building numbers and streets names will facilitate the direct-fire control planning. The use of azimuth and pace will be replaced with a greater reliance on terrain association. Route planning will use streets as primary routes vice azimuth and blocks vice meters.

- A proven technique is to develop a common reference system (see figure on page 18):
 - * **Areas:** Largest division.
 - * **Sectors:** Smaller sections of the area.
 - * **Buildings:** Numbered within the area.

G. Close Quarters Combat (CQC). Due to the very nature of a CQC encounter, engagements will be very close (within 10 meters) and very fast (targets exposed for only a few seconds). Most close quarters engagements are won by the one who hits first and puts the enemy down. It is more important to knock a man down as soon as possible than it is to kill him. In order to win a close quarters engagement, soldiers must make quick, accurate shots by mere reflex. This is accomplished by reflexive fire training. Survival in the urban environment does not depend on advanced skills and technologies, but proficiency in the basics.

- **Low-Carry Technique:** The butt stock of the weapon is placed in the pocket of the shoulder. The barrel is pointed down so the front sight post and day optic is just out of the field of vision. The head is always up identifying targets. This technique is safest and is recommended for use by the clearing team once inside the room.

- **High-Carry Technique:** The butt stock of the weapon is held in the armpit. The barrel is pointed slightly up with the front sight post in the peripheral vision of the individual. Push out on the pistol grip and thrust the weapon forward and pull straight back into the pocket of the shoulder to assume the proper firing position. This technique is best suited for the line-up outside the door. Soldiers should always avoid exposing the muzzle of their weapons around corners; this is referred to as "flagging."

- **Malfunction:** A weapon malfunction during any CQC requires that the soldier take a knee to conduct immediate action. Whenever other members of the team see a soldier down, they must automatically clear his sector of fire. Before rising to his feet, the soldier warns his team members of his movement, and only rises after they acknowledge him or he is picked up by a fellow teammate.

- **Approaching the Building or Breach Point:** Whenever possible, breaching and entry operations should be executed during hours and conditions of limited visibility. On approaching the initial breach point, noise and light discipline are essential. Do not make noise outside of a building. Do not slam into the wall when getting into the stack. Always take advantage of all available cover and concealment when approaching breach and entry points. When natural or manmade cover and concealment is not available, employ obscurants to conceal the approach.

- **Actions Outside the Point of Entry:** Entry point positions and individual weapon positions are important. The clearing team members should stand as close to the entry point as possible, ready to enter. Weapons are oriented in such a manner that the team provides itself with 360-degree security at all times. Team members must signal to one another that they are ready at the point of entry. This is best accomplished by sending up a "squeeze." If a tap method is used, an inadvertent bump may be misunderstood as a tap.

- **Actions Upon Entry:** Non-lethal grenades can be used prior to entering any type of structure. If an enemy force is known to occupy a room, fragmentation grenades can be used if the walls and foundations are suitable. Proper structure analysis is mandatory prior to the conduct of CQC. A fragmentation grenade has tremendous overpressure and missile hazard and may severely damage lightly constructed buildings. Rooms are never entered with less than two men. The #1 or #2 man shouts "short room" if the room is too small for the entire team.

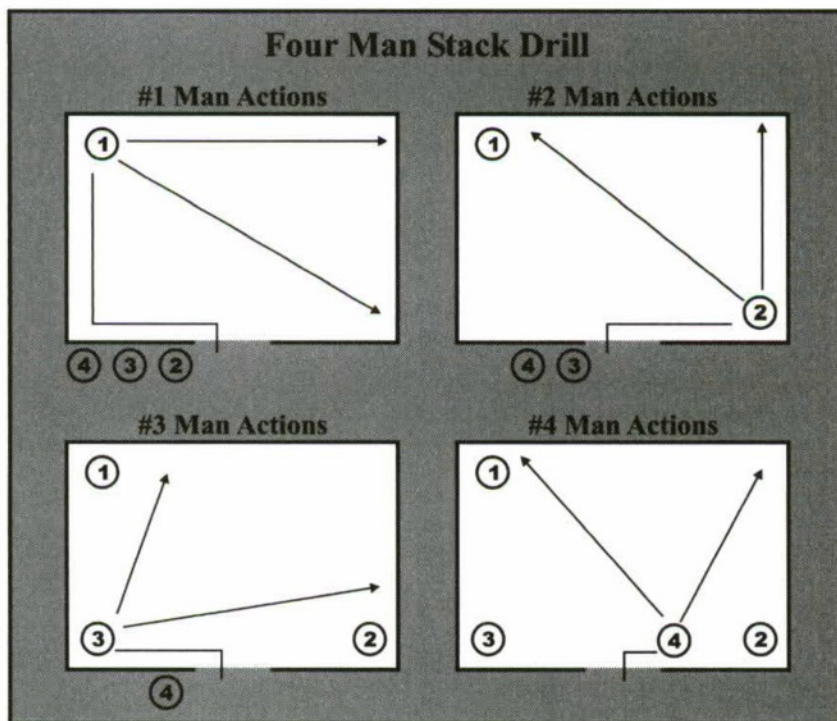
- **Clearing the Entry Point:** Team members must clear the point of entry to eliminate the enemy threat and allow remaining team members to move into the room. An entry point acts as a fatal funnel since it is the focal point for enemy weapon acquisition.

- **Clear the Room:** Team members move away from the entry point and assume positions within the room where the threat can be best eliminated. Any threat is eliminated or neutralized as individual team members move to their points of domination, not once they get there. Never move faster than you can accurately engage targets.

- **Local SBF:** Local support by fire (SBF) should be trained to look deep (buildings, doorways, and windows of adjacent buildings). Local SBF must pick up threat arcs of buildings being cleared when the team leader prepares his stack for entry.

- **Four-Man Stack:** To be effective, team members are numbered #1 through #4. The #1 man must act the quickest and make immediate decisions. The #1 man enters the room eliminating the immediate threat and has the option of moving left or right, moving to one of two

corners. The #2 man moves along the wall in the opposite direction of the #1 man. Both the #1 man and #2 man clear the breach point, their immediate threat areas, while moving to their dominating corner in the room. The #3 man goes the opposite direction of the #2 man inside the room and at least one meter from the door. The #4 man moves in the opposite direction of the #3 man. All team members stop when they have cleared the door and have reached their point of domination within the room. All team members must be prepared to perform the duties of all positions (#1-#4) after the initial room is cleared. All team members must be cross-trained in each position. ROE will impact the munitions employed and techniques used during urban clearing operations.



H. Urban Assault Breaching. Understanding how to employ and incorporate breaching is an important part of urban operations. It is imperative that elements of each urban patrol be skilled in the techniques of urban breaching. Planning and preparations for breaching are conducted for both infiltrating and exfiltrating from an objective. One constant disadvantage with the employment of explosives is that placement requires soldiers to expose themselves to possible

enemy fires. Breach teams are supported by fires or obscurants, and breaching operations should be performed during hours of limited visibility whenever possible.

I. Classifications Of Breaching.

1. **Mechanical:** Mechanical breaching allows the gaining of access by the use of tools or saws. Most tools and saws used are recognizable and self explanatory:

- Hooligan tools (doors/windows of all types).
- Sledge hammer (heavy duty doors, locks, and window frames).
- Picket pounder (doors of all types, light walls).
- Bolt cutters (chain link fence, locks, and wire obstacles).
- Pick ax (lightweight doors and locks).
- Saws (fences, light doors, locks).

2. **Ballistic:** Ballistic breaching is a forced entry or exit by the use of weapons. Whether using shotguns, M16A2/M4, or M249 SAW, specific considerations must be addressed.

- Type of round and ricochet factor.
- Composition of the breaching point.
- Composition of the floor beyond the door.
- Personnel behind the door (friendly/enemy).
- Always shoot at a 45-degree angle down through the locking mechanism.
- If a hinge side breach, shoot down at a 45-degree angle at the bottom and middle hinge, and up at the top hinge.

3. **Explosive:** Explosive breaching is the most effective. When employing explosives during breaching operations, three major factors are addressed:

- **Overpressure:** The amount of PSI released from the concussion of the blast.
- **Missile Hazard:** Fragmentation or projectiles sent at tremendous speed.
- **Minimum safe distance requirements (MSDs):** Use of explosives in the urban environment must consider the presence of noncombatants, friendly forces, and the risk of secondary explosions and fires.

SECTION IV: URBAN PATROLLING

A. Typical Patrol Deficiencies.

- Carelessness in movement, resulting in compromise by the enemy.
- Failure to conduct rehearsals.
- Land navigation errors.
- Poor planning of direct fires and insufficient control measures (e.g., routes, building numbers, boundaries).
- Complacency.
- Individual actions – thinking 3-D, 360-degree/spherical security at all times.

B. Execution of Patrols in an Urban Environment.

1. Prior coordination:

- Recon town or urban area to establish layout.
- Draw out diagram and label each building for soldiers to study with checkpoints. Use higher headquarters' building numbering system and routes if available.
- Brief soldiers on routes, alternate routes, and rally points along route.
- Identify possible threats in town (e.g., sniper, mines, vehicles).
- Brief soldiers on ethnic makeup of the area.
- Scan area with thermal sites if available.
- Ensure mounted and dismounted elements understand target reference points.

2. Movement through urban areas (dismounted):

- Leaders designate sectors for soldiers to scan.
- Patrols split up on left and right sides of road. Leaders and their radio telephone operators (RTOs) and machine-gun teams stay on the same side of the road. Depending on threat, sub-elements may advance by bounds with squads or fire teams setting, then bounding through each other, setting again.
 - Dismounts scan opposite side of road in urban areas (i.e., soldiers on the left side of the road scan the right side). This must be rehearsed. Soldiers must pay attention to windows, doorways, and roofs as potential threats.
 - Pause at intersections to allow soldiers across the road to check for threats prior to crossing.
 - Do not allow children to distract the patrol; do not give them trinkets or candy.
 - Always look for something out of the ordinary (i.e., a civilian overdressed for conditions or unattended bags and packages in roadways).

3. Movement through urban areas (mounted):

- In general, lead with the heaviest vehicle forward.
- Ensure loaders, tank commanders, and Bradley commanders scan upper story windows and assign sectors prior to movement.
 - Use dismounts to protect mounted forces when terrain/threat dictates.
 - Recon bridges for weight classifications prior to execution of patrol.

4. Other TTPs:

- Smaller patrols are easier to control in an urban environment.
- A warm, lighted dugout in each battalion should be reserved for exclusive use of patrols. Assemble the patrol there about an hour and a half before starting on a mission so that they can be warmed and given hot coffee. This procedure allows time, too, for such chores as field stripping, cleaning, and drying each weapon. During this time the mission should be thoroughly explained and each man's duties carefully reviewed. Maps and aerial photographs

should be studied in detail. All these things help to form the men into a team. They are the incidentals that pay off later in more effective performance of the patrol's duties.

- Two small patrols are better than one large one if they are in constant communication and terrain permits them to be mutually supporting.
- Walking in the footsteps of the man ahead helps conceal the number of men in the patrol and reduces the chances of setting off booby traps.
- Simply warning the men on the outpost line that friendly patrols are operating to their front is not enough. They should be told where and during what time the patrols will be operating.
- Prior to departure, work out with the artillery three or four easily recognizable target reference points (TRPs). Arrange to communicate directly with the artillery to get rapid action on requests for smoke (for orientation) and supporting fire.

World War II Vignette

Patrol experts from the United States Army's 99th Infantry Division, France, report effective use of a magic wand when it was necessary for small units to cross known minefields not covered with snow: "We had considerable success in detecting boobies by having one man precede us through the minefield holding a small stick tightly in his hand at an angle of 45 degrees with the end about 2 inches off the ground. Pressure of the trip wires against the stick warned him of eight booby traps in one day. Some trip wires are neck high, others only 6 inches or less from the ground. Remember that if you find one booby trap, there probably are more around." (Taken from Center for Military History website, WWII Collection)

5. One Mission Per Patrol: A patrol should have a single task and purpose. There can be a tendency by staff officers and commanders to add a second mission just because a patrol is going to be in the vicinity of some point in which they are interested.

6. Night Patrols:

- When the mission is reconnaissance, night patrols should consist of a small number of men. Higher headquarters should not prescribe the composition of a patrol. They should order that certain information be obtained, allowing the unit furnishing the patrol to decide on its composition.
- At night, send one squad-sized ambush and at least one fire-team-sized listening post. The squad that pulls the night ambush conducts a squad patrol in the morning, a second squad pulls an afternoon patrol, and a third squad secures the patrol base.
- The purpose of a day patrol is to select a site for a night ambush. A squad will rarely conduct an ambush at a site it has not seen in daylight.

7. Include an Engineer: Whenever possible, an engineer sapper should be sent with each patrol. It is reassuring for any patrol to have with it someone who is experienced in handling mines, booby traps, and explosives.

8. Assumptions: When on patrol, always assume that you are being watched and that if being watched, you are probably being followed.

9. Patrol Security:

- “Drop-Back Ambush.” The “drop-back” ambush is a technique used when the patrol suspects it is being followed. On a signal, two or more men, previously designated and scattered throughout the patrol, drop to the ground and cover the rear. The patrol continues to move a few hundred meters and set up security. The “drop-back” team remains in place 10-15 minutes and then rejoins the remainder of the squad. This tactic is repeated two or three times on a normal patrol and is very effective.

- “Cloverleaf.” This technique is very difficult in an urban environment and should only be used when building layout permits.

10. Presence patrols: Presence patrols provide a “cop on the beat” approach. Presence patrols use both mounted and dismounted patrol techniques to accomplish their tasks. Presence patrols are visible, show strength and discipline, and are combat ready. Stealth is not normally required or desired. Presence patrols also:

- Establish habitual relationships within sectors and communities.
- Provide information, news, and upcoming events to the community.
- Assist communities in requesting and receiving civil military operations projects.
- Encourage community projects and assist when appropriate.
- Provide quick fixes with medical or engineer assets.
- Are honest and fair and do not take sides (they arbitrate if necessary).
- Provide a living example of “professionalism” to the local police and military.

SECTION V: ARMORED VEHICLE-INFANTRY OPERATIONS

A. Advantages to Employing Armored Vehicles (Tanks, Bradley Fighting Vehicles, Strykers, LAVs, AAVs) with Infantry on the MOUT Battlefield.

- Provide suppressive fire for the infantry.
- Main gun or mounted machine-guns can destroy hard points, bunkers, and buildings, as well as create a hole in the wall of a building to provide an entry point for the infantry.
- Provide night observation as an aid to command and control and target detection.
- Provide thermal observation as an aid to see deep into windowed rooms for snipers.
- Act as a screening or isolation force outside of the urban terrain or on the outskirts while infantry assaults on the interior of the town.
- Shock effect of armor can disperse or deter enemy troop presence.
- Armored vehicles provide up to 18 inches of armor protection versus half-inch thick Kevlar flak jacket.
- Transport troops quickly for reserve or flank missions.
- Act as mobile stepladders to gain entry to second stories.
- Act as mobile assembly areas or command and control centers.

- Act as emergency armored resupply for all classes of supply (especially CL IV, V, and VI).
- Act as armored medical evacuation.

B. Weaknesses of Armored Vehicles (AV) on the MOUT Battlefield.

- Tank/AV commanders and drivers are vulnerable to enemy snipers.
- Elevated roadside bombs and improvised explosive devices/shaped charges.
- Improvised explosive devices buried under the roads.
- Rioters climbing on the tank. (Corps commanders must ensure ROE address this specific situation. Armored vehicle commanders must then be prepared to use lethal force to terminate this situation.)
- Vulnerable to constricted lanes, physical obstacles in urban areas.
- When destroyed or disabled, AVs become obstacles to friendly mobility.
- A lack of adequate ability to communicate with dismounted infantry.
- A vulnerability to improvised flame weapons.
- Limitations on the tank's ability to depress and elevate its weapons. (This creates significant dead space within the constricted urban area.)
- The tank's limitations on engaging very short-range targets with any technique other than battle sight.
- Difficulty in traversing the tank's main gun in confined spaces.
- Difficulty in maneuvering groups of armored vehicles in narrow roads and alleys. (This can be a significant problem when a column needs to turn around and take another route.)

C. Armored Vehicles on the MOUT Battlefield Checklist.

1. **Safety:** The armored vehicle commander briefs the dismounts on how to mount/dismount the vehicle, turret movement, location of machine-gun portals, heat exhaust, and, for the M1 tank, sabot pedal dangers (danger zone extends 70 meters left and right of the gun-target line and 1 kilometer down range).

2. **Communication Plan:** If available, use tank phones and squad radios and, at minimum, develop a hand-arm signal method between mounted and dismounted soldiers. Also, establish a report procedure between the mounted and dismounted forces that will help bring mounted fire on enemy positions. For example:

Line 1: Current friendly infantry position (to avoid fratricide).

Line 2: Current enemy target position (common set of graphics is key here).

Line 3: Description of target.

Line 4: Cleared and secured mounted route to target.

Line 5: Remarks.

3. Capability: Both armored vehicle and infantry leaders should exchange a quick review of asset capabilities (c.g., types of tank rounds, small arms available, ranges). Do not over use tanks or armored vehicles for the following reasons: (1) Current theaters of operations indicate that the local populace could become desensitized to the shock effect if tanks are tasked for every action; (2) Enemy-destroyed AVs (especially tanks) can have an impact at the strategic level, especially if documented by the news media; and (3) Overuse of tanks could indicate that you are panicking and bringing in more firepower than appropriate.

4. Security: The greatest threat to all armored vehicles in the urban fight is the many “blindspots” or dead space that exists very close to the vehicle.

- Assign a 4-5 man infantry fire team per vehicle to provide local dismounted security.
- Infantry are “eyes and ears” for the tanks in urban terrain. The tank crew has limited visibility from inside the tank, especially when buttoned up. Hearing is also limited due to the vehicle’s engine.
- The fire team remains with the tank at all times, paying close attention to windows, doors, and other openings.
- The fire team is constantly scanning for mines and/or improvised explosive devices (IEDs) on the ground, embedded into the sides of buildings (side attack), or from rooftops (top attack).
- The fire team needs to also ensure its own safety by understanding the lines of fire of the tank’s/AV’s direct-fire weapons. Fire teams and tank/AV vehicle commanders should establish a mutual range card and boundaries to ensure live-fire operations are controlled to reduce fratricide.

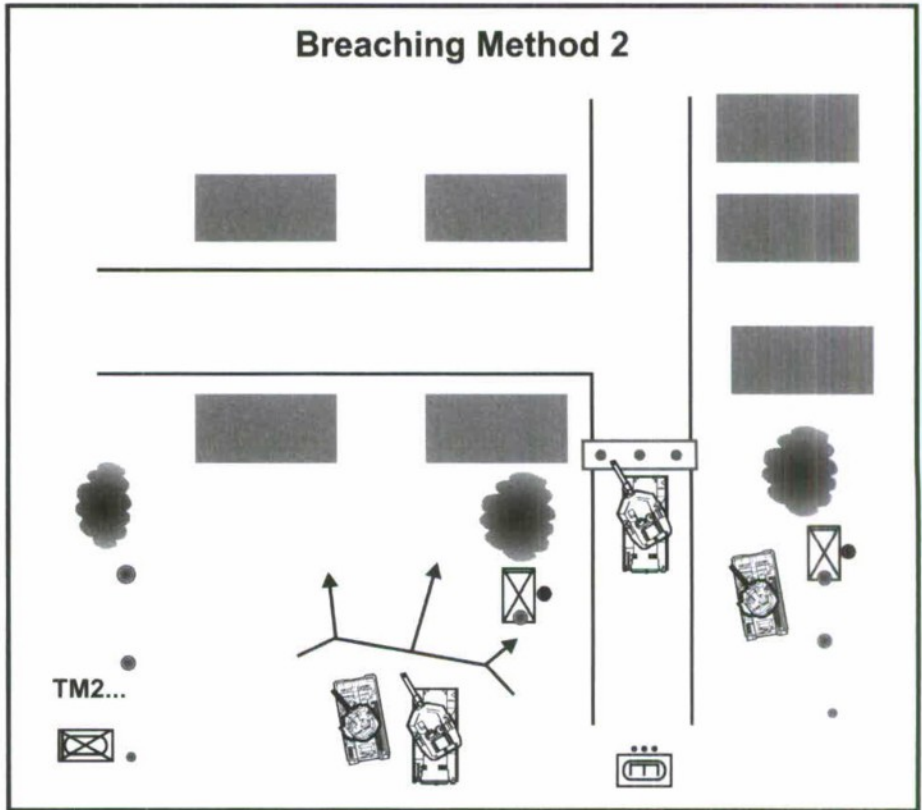
5. Load Plan: Armored vehicles must not be employed in urban operations with any extraneous and inflammable items stored or carried on the outside of the vehicle. Large amounts of personal equipment on racks on the sides of armored vehicles can cause the loss of the vehicle if it is struck by an improvised flame weapon.

6. Route Reconnaissance: Gain maps that show road and, if possible, bridge weight allocations. At a minimum, conduct map reconnaissance. If possible, also conduct route recon with scouts.

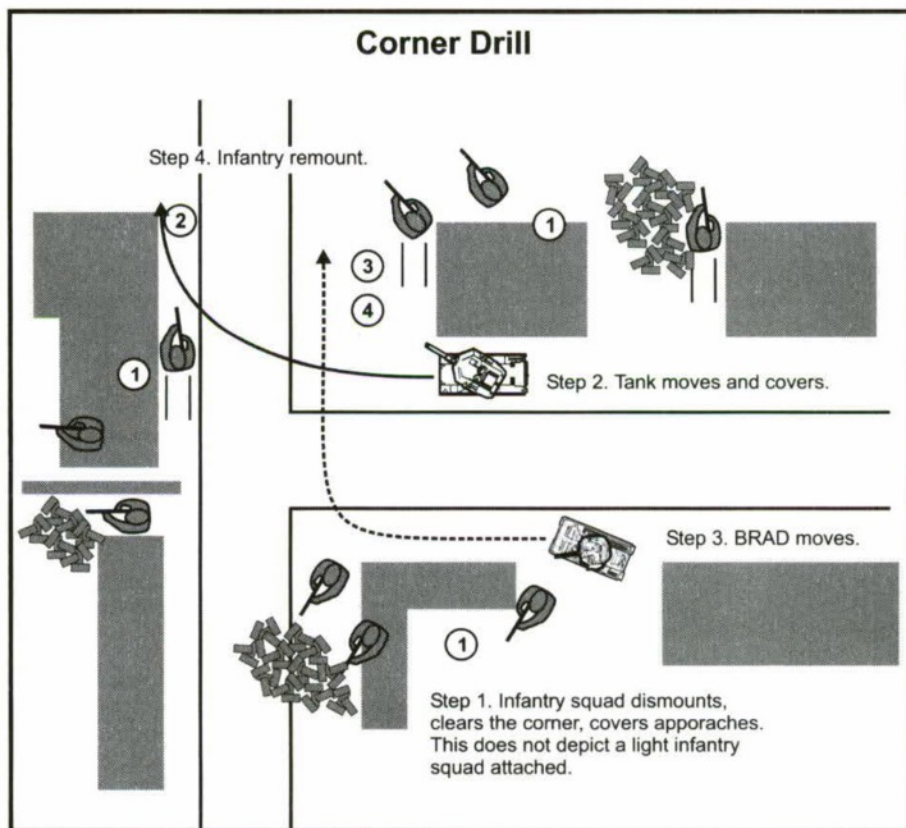
7. Know how to ride/dismount/mount on an AV.

D. Breach a minefield.

- If available at the company level, task organize a breach team (support, breach, assault) with the following: M1/M2 section (two tanks/two Bradley Fighting Vehicles), a light infantry platoon, and an engineer squad (see figure on page 27).
 - * BFVs and BFV dismounts provide overwatch from support-by-fire position.
 - * Tanks (one with plow and one roller) breach a lane.
 - * Engineer squad marks and further reduces the lane.
 - * Light infantry platoon assaults through the lane and secures the far side to gain the initial foothold.



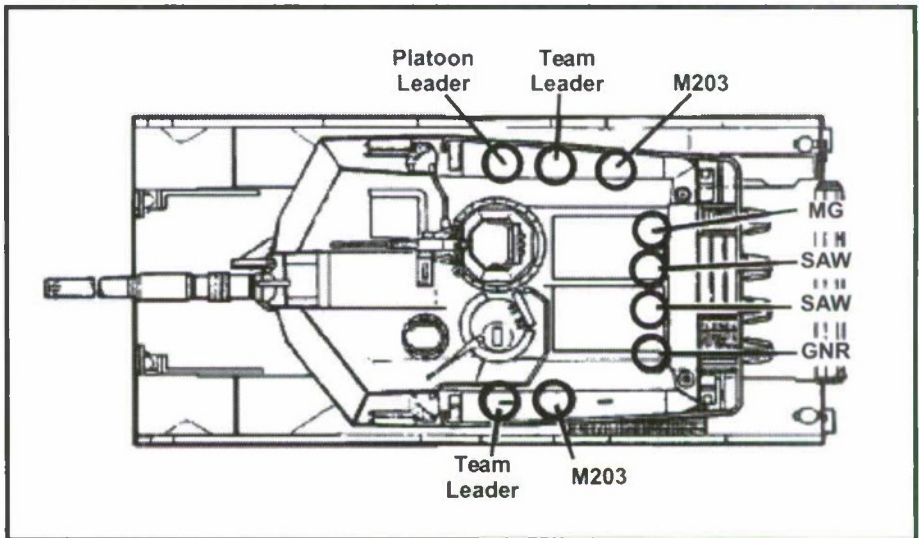
- Continue to expand the foothold using the "Corner Drill:" (1) Infantry squad dismounts, clears the corner, covers approaches; (2) Tank moves and covers; (3) BFV moves and follows; and (4) Infantry remount (see figure on page 28).



E. Infantry Riding on Armored Vehicles. Dismounted infantrymen may be required to ride on tanks or armored vehicles to maintain the operational tempo during tactical operations. While the following considerations are specific to the M1 series tank, these precautions can be applied in general ways to all armored vehicles.

- Mount up to one infantry squad on the turret in such a way that soldiers' legs cannot become entangled between the turret and the hull by an unexpected turret movement.

- When mounting an armored vehicle, soldiers must always approach the vehicle from the front to get permission from the vehicle commander to mount. They then mount the side of the vehicle away from the coaxial machine-gun and in view of the driver.
- Rope is used as a field expedient infantry rail to provide secure handholds.
- Ensure that everyone is to the rear of the smoke grenade launchers. This will automatically keep everyone clear of the coaxial machine-gun and laser range finder.
- No more than one soldier should sit on any of the turret blowout panels. In case of an ammunition bustle event, the panels will not eject properly if there is 250 or more pounds of pressure.
- The M1 tank is not designed to carry riders easily. Riders must NOT move to the rear deck. Engine operating temperatures make this area unsafe for riders.
- The infantry should not ride with anything more than their battle gear. Rucksacks and B-bags should be transported elsewhere.
- All soldiers must be alert for obstacles that can cause the tank to turn suddenly and for trees that can knock riders off the tank.
- Do not disengage the turret stabilization. The tank must be prepared to engage the enemy at all times. Brief the infantry to always be prepared for sudden turret movement.



SECTION VI: MILITARY WORKING DOG (MWD) OPERATIONS

The use of military working dogs (MWDs) for combat operations is a misunderstood and often misused asset on the modern battlefield. A highly trained MWD and handler provides the battlefield commander with a significant force multiplier and battlefield enabler. The use of MWDs in static operations should also not be overlooked. A dog used in this manner can provide input while stationed on listening posts to the handler who can then alert friendly forces. The utility of these animals has the ability to significantly shape the outcome of campaign operations.

A. Considerations for the Integration of MWD into Tactical Operations.

- The use of dogs also has a valuable psychological effect upon conventional enemy forces and terrorist operations.
- Dogs visible at checkpoint operations provide a detection capability and the appearance of a “hardened” position. A single dog can provide a deterrence profile not duplicated by mechanical devices.
- Employment of dogs should be reduced to early morning, early evening, and nighttime operations to take advantage of the cooler temperatures found during these hours. Nighttime operations have proven to be better suited for the dog’s senses, hearing, and smelling capabilities. However, a pattern of usage should be avoided. The use of a dog during high ambient temperature situations should be restricted to no more than 20 minutes on the line with one hour of rest in a cool environment.
- Every effort should be made to include handlers and their dogs in all operational briefings by battalion staff members to advise planners on the dog’s capabilities.
- The kennel master recommends the number of dogs necessary to support the mission and implement the necessary work/rest cycle while sustaining operations.
- Unit commanders need to ensure that security is assigned during combat operations to protect the MWD asset during combat activities.

B. Military Working Dog Missions. MWDs can be used in operational activities, such as tracking/patrol security, attack dog/building clearance, weapon and ammunition detection, explosive ordnance disposal and clearing, and riot control/security force multiplier. Although not inclusive, it should be noted that the activities listed above are proven capabilities for MWDs in recent history.

1. Tracking/Patrol Security:

- The MWD and his handler will work just forward of the lead element of a patrol with adequate security (2-3 individuals) to ensure the survivability of the dog and his handler.
- MWDs should be trained to work on leash and off leash. Off leash provides a greater range of detection for the patrol.
- A dog working off leash should not be allowed to operate farther forward than 500-700 meters. Optimum conditions would allow the handler to maintain line of sight with the dog.
- Although off leash work does provide a great utility by pushing out the contact range and providing an increased warning line for the patrol, there is the risk that the dog may become

incapacitated or killed by enemy/terrorist forces. Dogs can be trained to attack if they are detected or return to the handler if not detected.

- If detection occurs off leash and out of line of sight of the handler, the dog should be trained to return to the handler and sit passively to indicate a potential alert. Sitting passively will also indicate on-leash alert.
- Tracking and patrol security MWDs should not be trained to indicate a potential alert by barking. Audible alert could compromise friendly forces. An experienced handler will know his dog and understand what the animal is indicating.
- Dogs operating in a static position close to the handler should be trained to indicate an alert by a low growl. This growl will indicate to the handler the presence of enemy/terrorist forces and not compromise friendly positions.
- Optimum conditions would include the usage of ground surveillance radar to exploit the advantages of both assets.
- Depending on the weather conditions, a dog placed in a static environment can detect an individual from a distance as great as 1,000 meters.
- A MWD can pick up the track of an individual within 2 hours or as long as 12 hours, weather permitting.

2. Attack Dog/Building Clearance: Although not addressed by current battlefield doctrine, the use of MWDs to attack and hold individual enemy and terrorist forces should not be overlooked. A dog can be sent into a building, a confined space, or a cave to find, attack, and hold individuals until the handler and friendly forces can arrive to place the individual into custody. Although disadvantages do exist (injury or death of the dog), the dog is better suited to immediately find and subdue a subject in an area whose interior structure is unknown to friendly forces.

- Use of cameras mounted to dogs should be considered. The placement of a camera on the dog's body will allow the handler to see when the dog has made contact. The handler can then direct forces into the structure to further subdue the individual and limit potential injuries to the dog.
- A camera will also allow the handler to pass information on the layout of the building interior to the unit commander to minimize potential friendly force losses. The unit commander's place, once the dog is released, should be next to the handler/camera monitor.
- The MWD can initially hold and subdue a subject more effectively than friendly forces.
- MWDs can provide immediate feedback to the unit commander on the internal construction of the structure.
- MWDs can also be trained to search in the rubble of collapsed buildings for survivors.

3. Weapon and Ammunition Detection: Although not currently addressed by current battlefield doctrine, the use of MWDs to detect small arms and ammunition is of benefit to unit commanders to undermine enemy/terrorist small unit or disjointed enemy/terrorist unit operations.

- A dog trained to detect explosives can be easily trained to detect the gunpowder residue found on weapons, fired casings, or unexpended ammunition.

- The potential detection of small caches of weapons and ammunition will significantly reduce their usage and impact upon friendly forces operating in their area.

4. Clearing of Explosive Ordnance:

- Explosive detection dog (EDD) teams support units by detecting casualty-producing devices units may encounter.

- EDD teams usually work as part of an integrated team that includes engineers (or de-miners) using mine detector sets, mine probes, surveying instruments, and other mine-detection equipment.

- Specific tasks that EDD teams are capable of performing include assisting units by locating explosives in area surveys, field and road surveys, and performing casualty rescue.

- EDDs identify explosives and booby traps by the distinctive odors emitted by explosives and ordnance and the components of the explosive device (metal or plastic). EDDs can detect the scent of explosives commonly used in the construction of mines, metal and plastic mine components, exploded and unexploded ordnance (artillery and mortar rounds, shell fragments and casings), and materials used for trip wires or booby traps.

- Detection capabilities are reduced in areas of excessive noise and movement and by unfavorable weather and terrain conditions (rain, dust, fog, mud, snow, dense undergrowth, heavy woods, or thick foliage). An effort should be made during training to ensure that the dog remains passive to gunfire and explosions on the battlefield.

- Fatigue, hunger, thirst, heat, and frigid temperatures degrade a dog's effectiveness. In many cases a dog's effectiveness will be limited to 1 ½ to 2 hours of work under these conditions.

- Request EDD teams before entering areas where probabilities of encountering explosives or booby traps is high.

- EDD teams are included as early as possible into the unit conducting explosive ordnance disposal (EOD) clearance operations.

- EDDs should participate in all preparatory training, inspections, and rehearsals to enable handlers to understand the total scope of any upcoming mission.

- Commanders must designate security elements to overwatch EDD teams as they perform their mission.

- Require handlers to demonstrate the teams' method of operations to ensure commanders and soldiers understand employment techniques.

- Commanders should provide the handlers with a sample of the devices that are expected to be in the area of operation and, if possible, where exactly they are suspected to be located. Handlers can then familiarize their dogs with the devices and type of terrain that they will encounter during the operation.

- Although not current doctrine, the use of radios mounted on a dog and directed via audio input from the handler has proven extremely effective in the past. This technique allows the handler to direct the dog within line of sight of a potential mine or explosive location and limit friendly personnel exposure to explosives.

- The use of a leash with a quick disconnect device will allow the handler to detach the leash quickly and not cause the dog to drag his leash into a potential mined area. This will reduce the handler's exposure to a possible ordnance blast.

- Dogs should be trained to sit when they discover a scent they have been trained to locate.
- U.S. dogs should be trained to detect triacetone triperoxide (TATP) and ammonium nitrate in addition to the "nine" primary scents.
 - * When one of these explosive-related scents is detected, the dog is trained to follow the scent to within three feet of its source, then to sit pointing or facing the scent source.
 - * Handlers should constantly observe the route that the dog used on the way to the explosive. This will ensure that the handler avoids setting off an explosive device.
 - * Upon notification of this "alert," the handler will inspect the area carefully and mark the area the dog indicates to be the source of the scent.
 - * The handler then returns to a safe area, commands the dog to return, and always "rewards" the dog for the discovery.

5. Riot Control/Security Force Multiplier: Extreme caution should be applied before committing MWDs to a potential crowd control situation. Although the presence of a dog can be a powerful statement to an enemy or terrorist, it can elicit a reverse and potentially adverse effect upon individuals in a crowd control/riot situation.

- It is difficult to employ patrol dogs properly during demonstrations or riots due to the high levels of confusion and excitement and the large number of potential antagonists. Dogs should be trained to remain undistracted by loud noises and crowds.

- A crowd's reaction to a dog in a riot environment may be dependent upon location. In some areas of the world, the appearance of dogs at an angry crowd scene results in an escalation of violence. The crowd will often challenge soldiers to use the patrol dogs as a measure of force. This is particularly true if a situation can be manufactured or provoked, so as to later be interpreted as an "unreasonable" use of force by the military. In areas of predominantly Muslim presence, dogs cause extreme fear. This fear can be extremely advantageous and should be exploited when needed.

- The commitment of MWD teams for riot control should be only as an alternative to the use of deadly force to gain control of a situation.

- If the commander located on the ground directs the employment of MWD teams for direct confrontation with demonstrators, patrol dog teams should be held in reserve, out of sight of the crowd. As the situation worsens, dog teams may be moved forward to within sight of the crowd, but well away from the front lines.

- When committed to the front lines in direct confrontation, dogs are allowed to bite when and only under the specific circumstances authorized by the responsible commander. Dogs should never be released "freely" into a crowd.

- Other riot control force personnel should be positioned approximately three meters from any patrol dog team when conducting any form of riot control. This is done to prevent unintentional bite injuries to other, friendly, riot control force personnel that may happen to get between a dog and an instigator participating in the riot or demonstration.

- MWD teams must depart the area prior to the use of riot-control agents. MWD teams must move a safe distance from the crowd to ensure the safety of the dog.

C. Other MWD Items of Significance. The below items should be considered before deploying dog units in a combat environment.

- Canines become protective of their wounded handler and will attempt to prevent anyone from approaching the handler to administer first aid. If this should occur, the canine must be separated from the handler by coaxing the dog away with friendly words or food, covering the dog with a poncho to immobilize it, or roping or tying the dog. If none of these efforts are effective, the dog must be destroyed. A human will always take precedence over an animal; however, all efforts should be made to avoid this. A MWD is an expensive asset to replace.

- If a situation arises where a canine is injured but the handler is not, the handler must be allowed to accompany the canine.

- If wounded or killed, an MWD should be evacuated using the same assets and should receive the same consideration as that given to a soldier under the same circumstances.

D. Advantages and Disadvantages of MWD Deployment in a Combat Environment.

1. Advantages:

- Force multiplier.
- Presence in area can cause visceral effect upon enemy/terrorist forces.
- MWDs can be trained to perform a great number of skills on the battlefield.
- Ability to detect explosives and gunpowder is far greater than mechanical means.
- Ability to detect humans is far greater than mechanical means.

2. Disadvantages:

- Logistically cumbersome.
- Long training track before commitment to field.
- On duty activities need to be scheduled taking environmental considerations into account.
- Explosives training must be continually refreshed to maintain currency of ever developing explosive compounds.
- Initial cost of quality dog is extremely high.

CHAPTER 2

FORCE PROTECTION OPERATIONS

SECTION I: SECURITY OPERATIONS

The following tactics, techniques, and procedures (TTP) are important factors for commanders to consider when planning security for fixed sites in Iraq and Afghanistan. These TTP are taken from the CALL database on recent operations in Iraqi Freedom and Enduring Freedom and from lessons learned in discussions with our allies. These lessons are important because allied soldiers are experts in dealing with terrorist attacks due to the nature of their environment. U.S. soldiers can use the lessons learned provided in this chapter to successfully secure fixed sites in Iraq and Afghanistan, deter and prevent terrorist attacks, and save lives.

A. Securing Fixed Site.

- Lines of sight available to snipers must be considered and obscured where possible.
- Install sniper screens or, if not available, use reflective fragment retention film to obscure the interior of the facility during daylight.
- Establish crew-served weapons fighting positions offset with line of sight to the entrance so that if the entrance is compromised, effective firepower can be employed to deter further entry.
- Construct protective shelters and defensive positions to protect soldiers from artillery or mortar fire. Modify existing structures to meet survivability needs.
- Ensure soldiers practice alert procedures and develop drills to rapidly occupy positions when attacked.
- Construct fighting positions and “bunkers” so that they are structurally sound. They should be built under the supporting engineer’s supervision to determine which construction materials are required and if safety considerations are met.
- Vulnerability to explosives is reduced if adequate perimeters are established and critical areas are as far from the perimeter as practical. Standoff distance and window protection reduce blast effects. The drivers on distance include size of bomb, barriers, and construction of the building. The supporting engineer can determine the adequate standoff distance based on the threat. Interior clear zones need to be placed around high-threat areas (e.g., arms, ammunition, and explosives holding areas; police facilities; command and control buildings; and troop billets). Place the clear zone perimeter at least 30 feet from the facility exterior walls, clear the zone of all obstructions over four inches high (including rocks and vegetation), and light the clear zone.
- Use additional security measures, such as vehicles, to block high-speed avenues of approach.
- Improve physical security by installing additional barriers to screen high-risk targets.
- Effectively use military working dogs (MWD) to aid security. Dogs heighten the deterrent value of the security force, aid in detection of intruders (self-sustaining, self-transporting sensors) and, especially, trained dogs locate explosives.
- Use battle drills for the rapid response force.
- Do not rely solely on host nation personnel to provide perimeter security.

B. Buildings.

- Entry points must use effective vehicle barriers to preclude forced entry.
- Design the entry point to operate under all terrorist threat conditions.
- Illuminate the exterior of the entry point.
- Establish a search plan to detect bombs concealed on personnel or in bags/packages.
- Detect explosives by using guards or a combination of guards, explosive-detecting dogs, and explosive-detecting equipment.
 - Minimize the number and size of windows to limit available targets.
 - Arrange furniture and assets within the facility so that no occupants or assets are within direct line of sight.
 - Provide drapes, shades, or blinds to obscure vision through windows at night and, if required, use plywood to block windows.
 - Sensitive work areas must not be located in portions of buildings vulnerable to explosives.
 - Warning systems must be emplaced to provide immediate emergency notification to building occupants.

C. Installations.

- Use effective vehicle barriers and obstacles to channel vehicles.
- Design approach routes that limit approach to the installation. If the approach road already exists or cannot be curved, place obstacles to create curves.
 - It is especially important to slow vehicles before they reach the gates and between gates. Use “s” curves, traffic circles, or right angle turns in the road layout to slow vehicle approach.
- Separate vehicle and pedestrian traffic.
- Provide well-defined holding areas for unauthorized vehicles and vehicles being searched.
 - Illuminate the exterior.
 - Establish a vehicle search plan to detect bombs concealed in vehicles.

SECTION II: CHECKPOINT OPERATIONS

A. Purpose of Checkpoint Operations.

- In general, a unit conducts checkpoint operations in order to control its area of responsibility.
 - Checkpoints allow for the establishment of a “safe area” that will stay immune from outside influence and keep the ratio of forces unchanged.
 - Checkpoints deny the enemy freedom of movement and any detailed information gathering opportunities of facilities or locations they are sited to protect.
 - Well-planned checkpoints will contribute to the security of military units and to the security of certain portions of the populace in the area of operations. To be effective, checkpoints must not be able to be bypassed.

B. Advantages and Disadvantages of Checkpoints. Checkpoints will offer units the following advantages and disadvantages, regardless of the spectrum of conflict:

1. Advantages:

- They are an intimidating show of force.
- They provide soldiers, Marines, and commanders with better situational awareness.

2. Disadvantages:

- Establishes a pattern. Whenever soldiers and Marines are in static locations, the professionalism, procedures, weapons, and equipment are on display. This gives any potential enemy the ability to gather information on the way these operations are conducted.
- The level of effort required to conduct checkpoints securely and for any extended period will exhaust a force more rapidly.
- May lead to more local conflicts.
- The potential for direct attack in these static locations may also increase.

C. Checkpoint Types. Checkpoint operations encompass both vehicle checkpoints (VCPs) and personnel checkpoints (PCPs). VCPs and PCPs can be conducted at separate locations or they can be co-located and conducted simultaneously. Of these there are three types: *deliberate*, *hasty*, and *snap* (*immediate*).

1. Deliberate checkpoints are permanent or semi-permanent. They are typically constructed and employed to protect an operating base or well-established MSRs.

2. Hasty checkpoints are planned in advance and will be for a set period of time of short duration. Hasty checkpoints are frequently employed during the conduct of a vehicle or foot patrol.

3. Snap checkpoints are conducted when specific intelligence indicates that a checkpoint will hinder the enemy's freedom of movement at a specific time and place. Snap checkpoints are conducted immediately and often with little to no planning.

Vehicle Checkpoints. A checkpoint should consist of four zones: *canalization zone*, *turning or deceleration zone*, *search zone*, and *safe zone*.

1. Canalization Zone: The canalization zone uses natural obstacles and/or artificial obstacles to canalize the vehicles into the checkpoint.

- Place warning signs out forward of the checkpoint to advise drivers of the checkpoint ahead (at least 100 meters).
- Canalize the vehicles so that they have no way out until they have the consent of personnel controlling the checkpoint.
- This zone encompasses the area from maximum range to maximum effective range of your weapon systems. It usually consists of disrupting and/or turning obstacles.

2. Turning or Deceleration Zone: The turning or deceleration zone forces vehicles into making a rapid decision. The vehicle can decelerate, make slow hard turns, or maintain speed and crash into a series of obstacles.

- Ensure that vehicles are stopped facing an obstacle (e.g., berm, tank, or wall) that is capable of stopping a slow moving truck.
- Some obstacles will have to be improvised. Examples of these are:
 - * Downed trees
 - * Beirut toothpick – nails driven through lumber
 - * Caltraps placed across the road
 - * Debris, rubble, large rocks
 - * Abatis
 - * Road cratering
 - * Dragon's teeth, tetrahedrons, concrete blocks
 - * Mines
 - * Prepared demolitions
 - * Concertina wire

3. Search Zone: The search zone is a relatively secure area where personnel and vehicles are positively identified and searched. A decision is made to confiscate weapons and contraband and detain the vehicle or allow it to pass. The area is set up with a blocking obstacle that denies entry/exit without loss of life or equipment.

- Isolate the vehicle being checked from other cars by an obstacle of some type, which is controlled by a soldier or Marine.
- Emplace an overwatch position, with a crew-served weapon, in an elevated position to cover the vehicle, particularly the driver. The crew-served weapon should be mounted on a T/E and tripod.

The search zone is further subdivided into three subordinate areas:

- **Personnel search zone** - where personnel are positively identified, searched, and/or detained. This may include partitioned or screened areas to provide privacy, especially when searching women and children.
- **Vehicle search zone** - where vehicles are positively identified, searched, and/or detained.

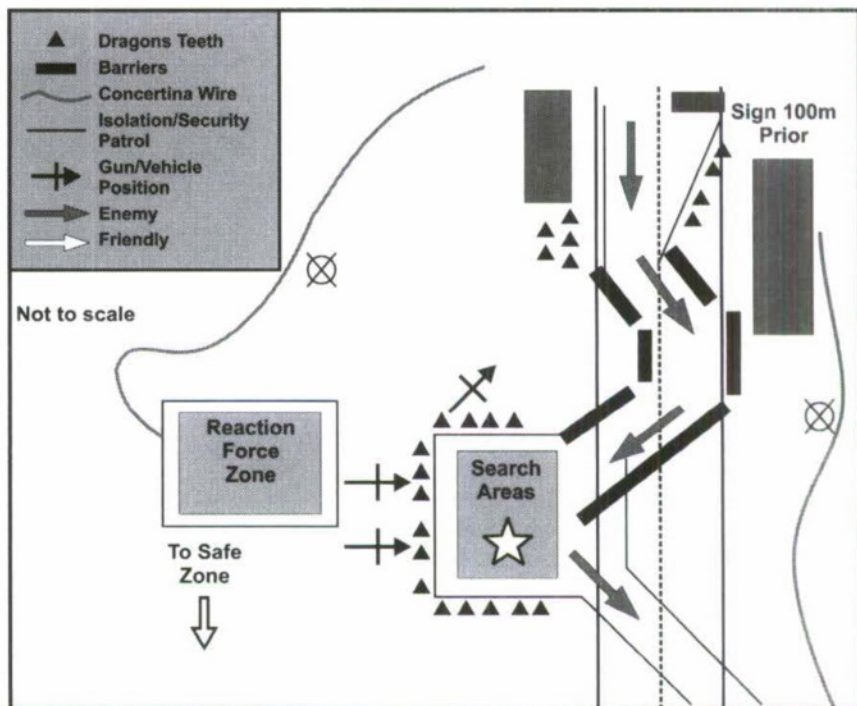
Both of these zones should consider the following:

- * Weapons' surface danger zones (SDZs), geometry.
- * All-around security.
- * Rapid removal of detainees and vehicles.
- * Capabilities and skill level of all attachments.

- **Reaction force zone** - where a reaction force is located to reinforce the checkpoint and immediately provide assistance using lethal and non-lethal force. Additionally, engineers,

MWDs, and EOD personnel may be co-located here to assist in analyzing and diffusing/destroying ammunition, demolitions, and/or booby traps.

4. **Safe Zone:** The safe zone is the assembly area for the checkpoint that allows personnel to eat, sleep, and recover in relative security.



D. Deliberate Vehicle Search Techniques.

- After a vehicle is identified as requiring a search, the interior searcher instructs the driver of the vehicle to slowly move it to a pre-designated search area. The area should provide blast protection for the surrounding area. The area should also possess a "dive pit" where personnel can seek blast protection. The search team takes its position in the search area.
- When the vehicle has stopped, the interior searcher instructs the driver to turn the vehicle off and slowly hand the keys to the exterior searcher.
- Driver is directed to slowly open the driver's side door and exit the vehicle.
- Other passengers are directed to exit the vehicle one at a time after the driver has exited.

- Conduct personnel searches of the driver and passengers. Move the other passengers to the rear of the vehicle; require a security team member to maintain eyes-on contact at all times.
- Ensure the passengers' hands are visible throughout the search.
- The interior searcher then directs the driver to a position to the rear left of the vehicle and remains with him.
- The exterior searcher examines the vehicle. He looks at the top of the vehicle, the rear, the left side, hood and front grill, light fixtures, and the right side. He then uses a mirror to examine the undercarriage and wheel wells.
- The exterior searcher notifies the interior searcher that the exterior search is complete. The interior searcher then escorts the driver to the hood of the vehicle and instructs him to open it. Once opened, the interior searcher moves the driver away from the vehicle and the exterior searcher examines the engine block, carefully avoiding direct contact. (Note: For exterior compartments, such as the gas cap area, require the driver to open the compartment for inspection.)
- Upon completion of the engine block check, the interior searcher instructs the driver to open the passenger side door(s). He then instructs him to open the trunk (and any other driver's side doors).
- The interior searcher instructs the driver to begin the interior search by placing his hands over the wrists of the driver. He directs the driver to slowly rub over the insides of the doors, seats (front and back), the ceiling, battery box (if in cab), open the glove compartment, and pass his hands over (touching) the floor carpeting. This process is repeated through each door entry as required to cover the complete interior.
- The interior searcher escorts the driver to the trunk. With the trunk previously opened, require the driver to slowly remove any loose items. (Note: If the spare tire well is in the trunk, require the driver to remove the tire to examine the well.) The interior searcher maintains control of the driver by placing his hands over the driver's wrists.
- Upon completion of the search, the interior searcher instructs the driver to slowly place any materials removed back into the original position, close all doors (except the driver's door), exterior compartments, the trunk, and the hood.
- The interior searcher directs the driver to re-enter his car. The exterior searcher returns the keys to the driver and instructs the driver to move his vehicle out of the search area and through the gate (or checkpoint). The security team moves along with the vehicle until it has cleared the search area.

SECTION III: EXPLOSIVE HAZARDS

Numerous soldiers and civilians have been killed or injured during every major conflict or operation since WWII as a direct result of handling or mishandling unexploded ordnance (UXO) or improvised explosive devices (IED). UXO/IED on the battlefield affects the mobility and mission aspects of all units. Battlefields are littered with UXO hazards from two sources:

- Ordnance and IEDs that have failed to function as designed.
- Ordnance and IEDs that have failed to detonate by design, such as area denial munitions, landmines, and booby traps.

Every soldier on the battlefield, within an operational theater, or in a military training area must be able to recognize and react properly to the UXO hazard.

There are three basic steps to take when reacting to a UXO:

- Recognize the explosive hazard
- React to the explosive hazard
- Report the explosive hazard

The ability to recognize, react, and report an explosive hazard is imperative to the Army's ability to maneuver, survive, and ultimately accomplish any mission within any operational theater in the conduct of training or combat operations.

A. Recognize the Explosive Hazard.

- Do not approach any closer to a UXO once it has been identified. Approaching a UXO can cause it to detonate.
- Do not strike, jar, or touch a UXO.
- Do not move or remove anything on or near a suspect UXO. UXO can be extremely sensitive and cause serious injury or death if disturbed.
- Do not make radio transmissions within 100 meters of a UXO. Some UXO are sensitive to electro-magnetic radiation (EMR) and can detonate. UXO can contain explosive, incendiary, chemical, biological, or radiological hazards.

UXO can be categorized into four basic groups based on their method of employment: *dropped, projected, placed, and thrown.*

1. Dropped:

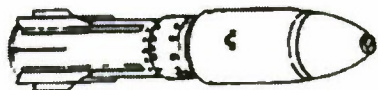
a. Bombs (see page 42):

- Vary in length from 3 to 6 feet.
- Vary in diameter from 5 to 36 inches.
- Often have a sloped or "bullet-shaped" nose, fins, or type of parachute on the rear.
- Can contain explosive, incendiary, chemical, biological, or radiological fillers.

Bombs



70.50 inches



55.90 inches



41.70 inches

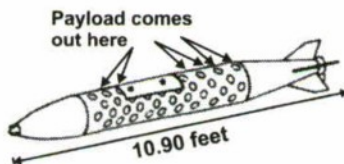
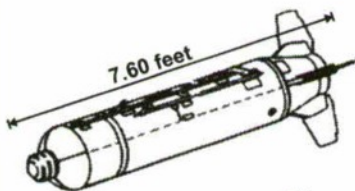


87 inches

b. Dispensers:

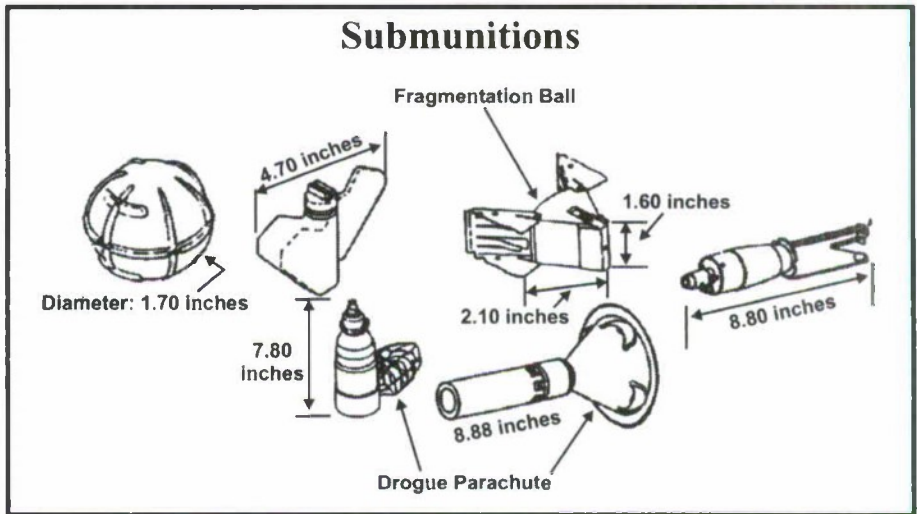
- Retained on aircraft or released.
- Contain multiple submunitions or bomblets.
- Most have the same characteristics as bombs.
- May be found intact, damaged, or partially open.

Dispensers



c. Submunitions:

- When a submunition is encountered, leave the area by the same path. There may be many more in the same area.
- Size does not diminish the danger of submunitions; the smallest can just as easily injure or kill.
- Can contain explosive, incendiary, chemical, or biological fillers.
- Designed to saturate an area to deny use.
- Come in numerous shapes and sizes; may or may not be "bullet" shaped.
- Can resemble balls (golf/baseball), wedges, or cylinders.
- May or may not have parachutes, ribbons, strings, fins, or trip wires.

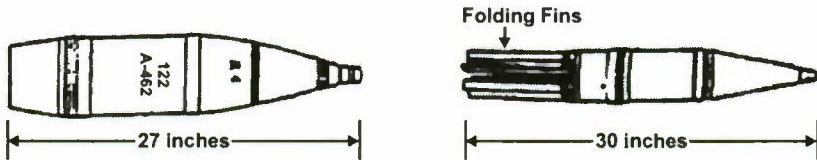


2. Projected:

a. Projectiles (see page 44):

- Include munitions from large machine-guns, artillery, and naval gun systems.
- Range in size from 20-mm up to 16 inches in diameter, and 10 to 48 inches in length.
- Most resemble a "bullet" in shape.
- Can contain explosive, chemical, biological, radiological, incendiary, or submunitions as fillers.

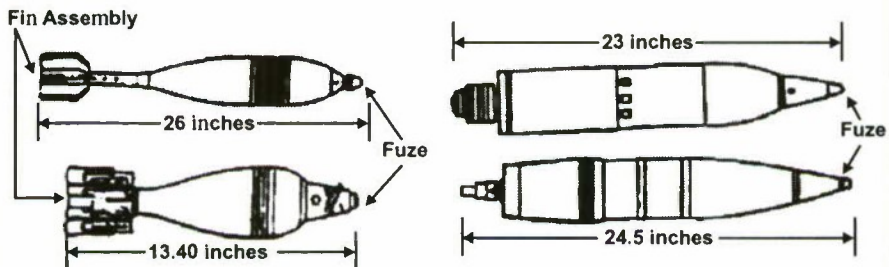
Projectile



b. Mortars:

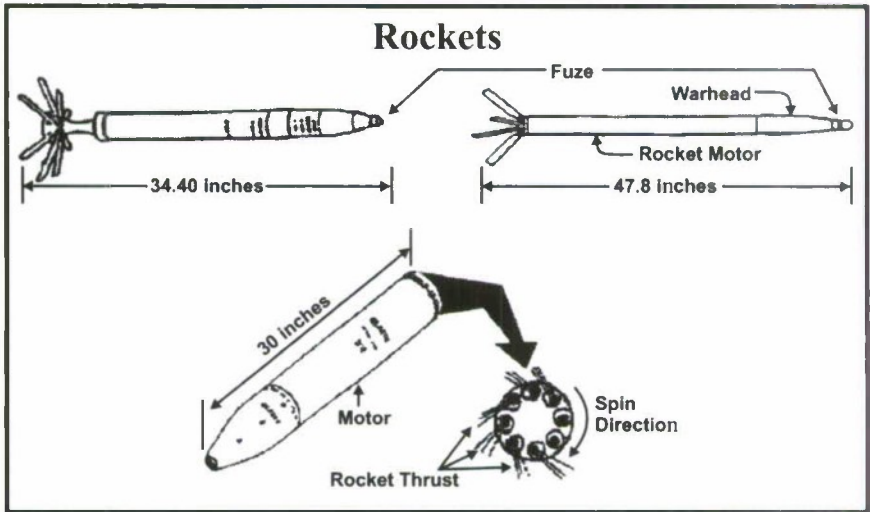
- Most have fins and also resemble a “bullet” in shape.
- Range in size from 50-mm (2 in) to 180-mm (7 in) in diameter and 12 to 36 inches in length.
- Can contain explosive, chemical, or incendiary fillers.

Mortars



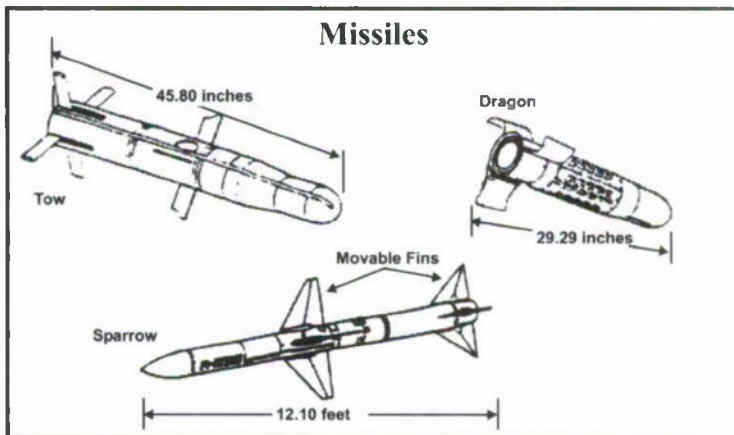
c. Rockets (see page 45):

- May or may not have fins; will have some type of rocket motor for propulsion.
- Range in size from 57-mm (2.25 in) to 300-mm (12.0 in) in diameter, and can be 24 inches to several feet in length.
- Can contain explosive, chemical, incendiary fillers, or submunitions.



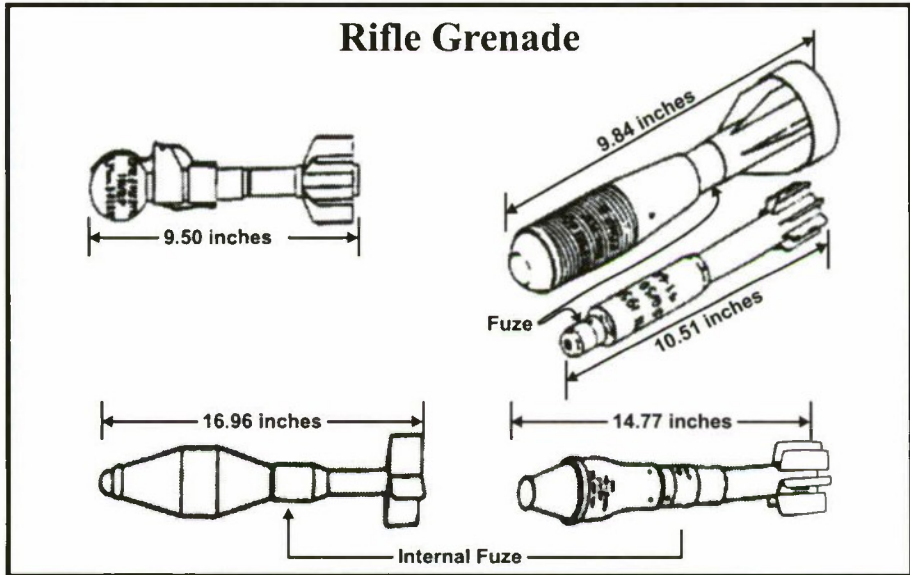
d. Guided Missiles:

- Most have fins; some are wire guided.
- Similar to rockets in both shape and size.
- Can contain explosive, chemical, incendiary, or submunitions as fillers.



e. Rifle Grenades:

- Fired from rifles or may be tube launched from the shoulder.
- Resemble rockets, only smaller in overall size.
- May contain explosive or incendiary fillers.



3. Placed (see page 47):

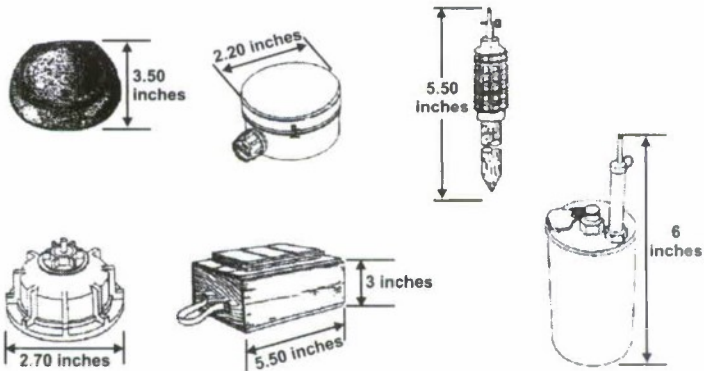
- Do not attempt to uncover or remove placed ordnance for any reason.
- Consider all mines to be booby-trapped or have anti-disturbance fuzing systems.
- Range in size from 2 inches in diameter to several feet in length.
- May incorporate a variety of fuzing systems to include pressure plates, tilt rods, trip wires, and electronic or magnetic sensors. Can also be emplaced for command detonation.
 - May contain explosive, incendiary, or chemical fillers. Includes the three basic types: anti-personnel, anti-tank (includes vehicles), and booby traps.

4. Thrown (see page 47):

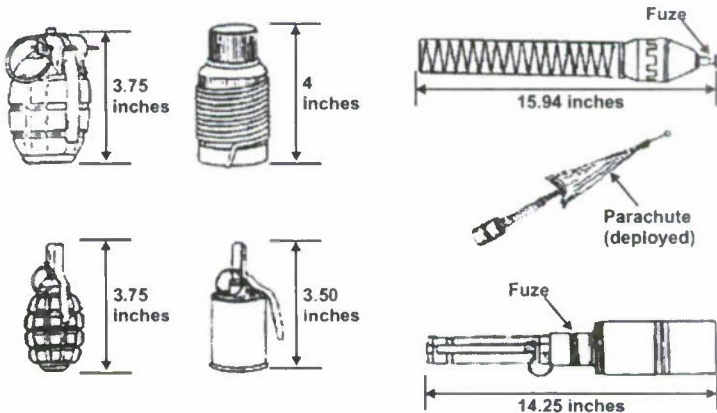
- Includes all types of hand-delivered grenades and simulators; most are round or cylindrical in shape.
- May contain explosive or incendiary fillers.
- Dud simulators require the same precautions and procedures as other UXO.

- Do not approach a grenade that was thrown and did not detonate, even if you threw it.
- Do not move, jar, or disturb a dud grenade. The fuze may function at any time. Do not pick up, move, or disturb a found grenade, even if the spoon or safety pin is attached.

Placed



Thrown



Improvised Explosive Device (IED): An IED is a “homemade” device that is designed to cause death or injury by using explosives alone or in combination with toxic chemicals, biological toxins, or radiological material. IEDs can be produced in varying sizes, functioning methods, containers, and delivery methods. IEDs can utilize commercial or military explosives, homemade explosives, or military ordnance and ordnance components.

1. **Package Type IED:** The most commonly used IEDs fall within this category. IEDs come in different sizes and types, but share some common identification characteristics.

a. **Container size/type.** IEDs can vary in size from a ballpoint pen to a water heater and often are contained in innocuous objects to camouflage their true purpose; the type is limited only on the imagination of the terrorist. Containers are usually heavy metal casing to maximize the fragmentation effect on the intended target. Commonly observed containers include:

- Lead/metal/PVC pipes with end caps (most common).
- Fire extinguishers.
- Propane tanks.
- Mail type packaging.
- Wood/metal boxes.
- Papier-mache or molded foam/plastic “rocks.” Camouflaged containers made to look like rocks, usually employed along desert roads/trails.

• Military ordnance. Modification of military ordnance; uses an improvised fuzing/firing system.

b. **Fuzing/firing systems.** The method of initiation of the device varies.

- **Time device:** Uses analog or digital clocks or watches or electronic components.
- **Command detonation:** Uses electric leads, radio control, or cell phones. Cell phones have become the more common command detonation method.
- **Booby trap:** Mechanical means include trip wires and pressure or pull-actuated switches. Electronic means include passive infrared (PIR) sensors and light or acoustic sensors, all of which are readily available at electronics stores.

c. **Effect types.** The intended effect of IEDs is also varied and depends on the intent of the terrorist.

• **High explosive/fragmentation:** Utilizes blast effect from the explosive and fragmentation from metal casing and/or the addition of nails, rocks, and glass to cause death or injury to personnel or the destruction of property.

• **Explosive formed penetrator (EFP):** This type of IED is an imitation of the effect of some types of anti-vehicle/anti-tank munitions. The explosive is packed behind a concave-shaped heavy metal disk and is aimed in a specific direction. Upon detonation, the explosive forms the metal disk into a high-energy projectile, propelling it into a specific target area capable of disabling vehicles.

• **Shape charge:** Another imitation of the effect of military anti-tank munitions. The explosive is packed behind a cone-shaped object, which forms a high-energy plasma jet that penetrates metal armor.

• **Hoax device:** A non-hazardous item is made to look like an actual IED that is used as a diversion or to test security force response procedures.

- **Chemical, biological, radiological contamination:** IEDs can contain these types of materials to cause death or injury. Uses the same firing systems and explosives to disperse the material over a wider area.

d. **Common Characteristics.** Key identification features and indicators of suspected IEDs or the presence of IEDs include:

- Exposed wires, cord, or fuze protruding from objects that usually do not have such attachments.
- Unusual smells, sounds, or substances emanating from objects.
- Items are unusually light or heavy for their size.
- Object seems “out of place” in its surrounding.
- Object or area is being noticeably avoided by local populace.
- Object is used with written or verbal threats; thrown at personnel or facilities.

2. **Vehicle-Borne IED:** These IEDs are devices that use a vehicle as the package or container of the device. The size will vary by the type of vehicles available — small sedans to large cargo trucks. Larger vehicles enable larger amounts of explosive that can be used, resulting in a greater effect. Functioning of devices can vary within the same methods as the package types and can have the same common characteristics or indicators as other IEDs with the following additional indicators:

- An auto that is riding low on the springs or resting low in the rear, especially if the vehicle seems empty. Explosive charges can also be concealed within the panels of the vehicle, distributing the weight around the rear end.
- Suspicious large boxes, satchels, bags, or any type of container in plain view.
- The firing system of the device is sometimes found in the front of the vehicle (timer, switch). The main charge, usually out of sight, is found in the rear of the vehicle.
- Boxes, containers, or other similar items on, under, or near the front seat in the driver's area of the vehicle. Wires or rope-like material coming from the front of the vehicle, then traversing back to the rear passenger area or disappearing into the trunk area.
- Unusual or overwhelming fuel-like odors.
- Owner/driver cannot be located; driver exhibits some sort of suspicious behavior.

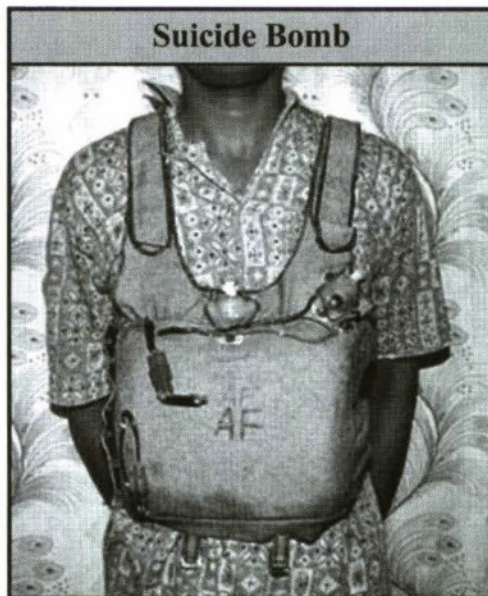
3. **“Suicide Bomb” IED:** A suicide bomber brings a singularly difficult threat for soldiers. The aim of the terrorist is not to commit suicide, but to kill or injure as many other soldiers and civilians as possible.

a. **Delivery Methods.** The two basic methods of employing devices are by person or by vehicle.

- A “person-borne” suicide bomb usually employs a high-explosive/fragmentary effect and uses a command detonation firing system, some sort of switch or button the person activates by hand. Explosives with fragmentation can be contained in a vest, belt, or clothing that is specifically modified to carry this material concealed.
- A vehicle-borne suicide bomb employs the same methods and characteristics of other package or vehicle bombs using a command detonation firing system.

b. Indicators of a Suicide Bomber:

- No true profile. Can be men, women, or children of varying ages. (Recent Palestinian bombers were female teenagers.)
- Attempts to blend in with the target environment.
- Usually no distinctive or identifiable clothing used; on occasion have worn military uniforms.
- May be wearing a coat or jacket that looks too big or bulky for the wearer and may be out of place for the climate.
- Exhibits verbal or other signs of fanatical religious beliefs; praying fervently.
- Males may shave their heads or have a short haircut with no beard, and may smell of perfume (unusual for Arab men). Appears nervous and may be sweating.
- Some Islamic males will disguise themselves as a woman to enable them to reach their intended target.
- If the device is carried, the person will usually maintain a strong grip on the bag, keeping the bag close to their body, and squeezing or even stroking the bag.



c. Special Considerations:

- Will attempt to detonate their device if they believe they have been discovered.
- Not all suicide bombers are of direct Middle Eastern descent; can be of any nationality, linked only by sympathetic views of a terrorist group's cause(s).

- If the suspect is determined to be a suicide bomber, then deadly force is normally the only response option. Prepare for and expect a detonation; shoot from a protected position at as great a distance as possible.

B. React to the Explosive Hazard.

1. Immediate Actions:

- Do not approach closer to a suspect UXO/IED once it is identified. Approaching a UXO/IED can cause it to detonate.
- Do not strike, move, or touch a suspect UXO/IED.
- Do not move or remove anything on, near, or attached to a suspect UXO/IED.
- Do not use radios, radar equipment, cellular phones, or any other electronic device within 100 meters of a suspect UXO/IED.
- If there are peculiar smells, liquids, or dead animals in the area of the UXO/IED, chemical or biological agents may be present. Don MOPP IV immediately.







2. Mark the UXO/IED:

- Mark the location similar to marking a contaminated area (if possible). Use easily recognizable material such as white engineer tape, marking or survey ribbon, clothing, or a UXO/IED marking sign. Place markers facing friendly forces avenue of approach (facing out from the UXO/IED).
- Place the marker above ground between the waist and head level. Use natural and manmade structures if available. Ensure marker will stay in place once set.
- If driving a stake in the ground as a marker, drive the stake away from the UXO/IED site.
- Take note of the physical characteristics of the UXO/IED and terrain features surrounding the item for future identification.
- Mark the UXO/IED so that friendly forces can avoid the area.

3. Evacuate:

- Withdraw from the suspect UXO/IED along the same path you entered, watching for additional hazards.
- Evacuate other personnel and equipment from the suspect UXO/IED area.
- For submunitions; placed, thrown, and small projected munitions (105-mm in diameter or smaller); and small IEDs (briefcase, pipe bomb), evacuate a 360-degree perimeter, a minimum of 300 meters.
- For bombs, dispensers, large projected munitions (106-mm in diameter and larger), and larger IEDs (large packages), evacuate a 360-degree perimeter, a minimum of 600 meters.
- For vehicle-borne IEDs or suspect vehicles, use the following chart:

BATF Explosive Standards

ATF	Vehicle Description	Maximum Explosives Capacity	Lethal Air Blast Range	Minimum Evacuation Distance	Falling Glass Hazard
	Compact Sedan	500 pounds 227 Kilos (In Trunk)	100 Feet 30 Meters	1,580 Feet 457 Meters	1,250 Feet 381 Meters
	Full Size Sedan	1,000 Pounds 455 Kilos (In Trunk)	125 Feet 38 Meters	1,750 Feet 534 Meters	1,750 Feet 534 Meters
	Passenger Van or Cargo Van	4,000 Pounds 1,818 Kilos	200 Feet 61 Meters	2,750 Feet 838 Meters	2,750 Feet 838 Meters
	Small Box Van (14 Ft. box)	10,000 Pounds 4,545 Kilos	300 Feet 91 Meters	3,750 Feet 1,143 Meters	3,750 Feet 1,143 Meters
	Box Van or Water/Fuel Truck	30,000 Pounds 13,636 Kilos	450 Feet 137 Meters	6,500 Feet 1,982 Meters	6,500 Feet 1,982 Meters
	Semi-Trailer	60,000 Pounds 27,273 Kilos	600 Feet 183 Meters	7,000 Feet 2,134 Meters	7,000 Feet 2,134 Meters

- If personnel or equipment cannot be evacuated, seek frontal and overhead cover.
- Consider construction of protective measures if you must remain in the area.
- Evacuated personnel must also seek frontal and overhead cover.
- If UXO is suspected to be a chemical munition, ensure all personnel stay upwind of the UXO in MOPP IV.

C. Report the UXO Hazard. Proper format is not as important as getting the information to the higher HQ and EOD. At a minimum, the report must contain:

- “Who” discovered the item (point of contact).
- “What” item is (type/subgroup).
- “Where” the UXO/IED is (location/grid).
- “When” the item was discovered.

The UXO Spot Report: Report the UXO/IED hazard to the chain of command to request explosive ordnance disposal (EOD) support using the nine line UXO Spot Report. The report consists of the following information:

Line 1: Date time group discovered (command policy will dictate Local or Zulu)

Line 2: Reporting activity (UIC/unit designation). Location (grid): (include landmarks, reference points, or street addresses)

Line 3: Contact method (radio freq/call sign or telephone number. If using phone number, provide name.)

Line 4: Type of munition (dropped, projected, placed, thrown, IED, to include subgroup, if known)

Line 5: NBC contamination (Yes or No, known or suspected NBC contamination. If yes, report type of agent if known/identified.)

Line 6: Resources threatened (what resource is threatened - is it a critical asset?)

Line 7: Impact on mission (how the UXO/IED is affecting the mission)

Line 8: Protective measures taken (unit-emplaced protective measures)

Line 9: Recommended priority (immediate, indirect, minor, or no threat)

Sample Report:

Line 1: 121300LMAR98

Line 2: 1-75th Infantry Bn, C-Co, EP2134567891, 150 meters south of the grid referenced road junction.

Line 3: 49.7000, Tripwire 60 or 1-800-435-6789, SFC Snuffy

Line 4: Projected, Mortar

Line 5: None

Line 6: MSR Speedway

Line 7: Unit cannot conduct resupply operations; MSR is not passable.

Line 8: Constructed sandbag barricade and evacuated non-essential personnel 300 meters. Mission essential personnel are in protective gear; all are utilizing frontal and overhead cover.

Line 9: Immediate

(Note: The following references were used to compile the preceding information: FM 21-16, *UXO Procedures*, 30 August 1994; and Training Support Package, 093-401-5040, React to Unexploded Ordnance Hazards, 06 May 2003; EOD Center of Excellence, USAOMEMS, Redstone Arsenal, AL.)

SECTION IV: CONVOY OPERATIONS

Convoys are planned and organized to control and protect vehicle movements. They are used for the tactical movement (personnel, supplies, and equipment) of combat forces and of logistical units. This section contains information on aspects of convoy operations.

A. Convoy Operations.

1. **Pre-Execution Checklist:** Key to the success of convoy operations is ensuring all personnel and equipment is properly prepared for the execution of the mission. The sample checklist on page 55 provides guidance on how personnel and vehicles should be equipped for convoy operations.

2. Convoy Planning Considerations:

- En route recovery.
- Ambulance/medical coverage. (Note: Most ambulances have radio communications, to include casualty evacuation procedures.)
- Disperse combat lifesavers throughout convoy.
- Designate responsibilities such as aid and litter teams.
- Rest plan for drivers.
- Window screens to deflect grenades.
- Security considerations to prevent pilferage from the convoy.
- MP, infantry, or other escort.
- Disperse key personnel throughout the convoy — cross load!
- Identify convoy signals.
- En route target reference points and identify available fire support.
- Air cover (close air support).
- Air guard.
- Deception plan.
- Closure report at destination and upon return.
- Reconnaissance of the route if possible (air reconnaissance is the preferred method).
- Enemy threat capabilities and potential courses of action (to include a mine overlay from higher headquarters, if available).
- Civilian considerations along the route.
- Establish phase lines/checkpoints along the route to monitor progress of the convoy.

INDIVIDUAL CHECKLIST	RUCKSACK (as needed for mission)
Weapon	Sleeping bag
Kevlar	One set BDUs
LBE w/two canteens (topped off)	Two T-shirts
First aid pouch w/dressing	Two pr underwear
Ammo pouches w/basic load	Two pr socks (blk/grn)
Flashlight w/batteries	Polypro top/bottom
ID tags	Cold-weather boots
Military ID	Personal hygiene kit
MRE	Gore-Tex top/bottom
Civilian Driver's License	Wet-weather gear
MOPP Gear	Cold-weather gloves
Combat lifesaver kit	Polypro glove insert
Mission brief	MREs, three each
OVM keys	
AAA card	
VEHICLE CHECKLIST	LEADER CHECKLIST
Completed 5988E (before PMCS)	Binoculars
Current vehicle dispatch	Radio check (internal, command, A&L)
Truck topped off	Convoy movement order
Additional package products	Map of sector w/current graphics
VS-17 panel	Strip map
Extra fuel can	Sensitive items/personnel list
Class I basic load (MRI's and water)	Combat lifesaver w/kit
Radio check (if applicable)	Current situation brief
BII complete	Risk assessment
Snow chains w/tie down	GPS (operational)
Tow bar	Vehicle and personnel manifest
All cargo secured	
Road guard belt	
Flashlight	
Map	
Warning triangles	
Fire extinguisher	
Sandbags for hardening	

3. Briefings: Two hours prior to start point (SP)

- Tactical brief - enemy/friendly situation update from S2.
- Convoy execution matrix (strip maps given to all drivers).
- Safety brief - use risk management and risk reduction (mitigating measures).
- Battle drills.
 - * React to civil disturbance (not blocking the route).
 - * React to potential opposing force (blocking the route).
 - * Air attack.
 - * Artillery/indirect fire.
 - * Sniper fire.
 - * Ambush.
 - * Mines, booby traps, and improvised explosive devices.

4. Rehearsals:

- Battle drills - What is expected of everyone? Who does what in each situation?
- Routes - A technique is to paint routes and terrain features on a large piece of canvas.

This allows the "sand table" to be moved. It also allows drivers to "walk" the route prior to departure.

- CASEVAC - What happens if casualties are sustained? Are the aid and litter teams designated and do they know what to do?
- Communication - To include audio, visual, and radio. Redundant means of communication is critical to mission success. What is the plan if primary communication fails? Primary and secondary frequencies? Call signs/frequencies for close air support/fire support?
- Security forces - Are roles and responsibilities understood?
- Is a response force available if the convoy becomes engaged? Call signs and frequencies for the response force?

B. Convoy Organization.

1. Convoy Sections: Leaders must know how to position vehicles within the elements. All columns, serials, and march units, regardless of size, have four parts: scout, head, main body, and trail. Each of these parts has a specific function.

• **Scout:** A scout vehicle proceeds 3-5 minutes in front of the main body. The task for the scout vehicle is to ascertain road conditions and identify obstacles that may pose a threat to the convoy. However, METT-TC conditions may not allow for the use of a scout vehicle.

• **Head:** The head is the first vehicle of each column, serial, and march unit. Each head vehicle should have its own pacesetter. The pacesetter rides in this vehicle and sets the pace needed to meet the scheduled itinerary along the route. The officer or NCO at the head ensures that the column follows the proper route. He may also be required to report arrival at certain checkpoints/phase lines along the route. With the head vehicle performing these duties, the convoy commander has the flexibility to travel the column to enforce march discipline. Commanders and planners should consider using heavy, well-protected vehicles as the head

vehicle if a minefield or IED is encountered. By doing so, the head vehicle has a greater ability to sustain damage while protecting the crew and any passengers.

- **Main body:** The main body follows immediately after the head vehicle and consists of the majority of vehicles moving as part of the convoy. This is the part of the convoy that may be subdivided into serials and march units for ease of control.

- **Trail:** The trail is the last sector of each march column, serial, and march unit. The trail officer/NCO is responsible for recovery, maintenance, and medical support. The recovery vehicle, maintenance vehicles, and medical support vehicles/teams are located in the trail. The trail officer/NCO assists the convoy commander in maintaining march discipline. He may also be required to report clear time at checkpoints or phase lines along the route. In convoys consisting of multiple march units and serials, the convoy commander may direct minimum support in the trail of each serial or march unit and a larger trail party at the rear of the column. As the trail party may be left behind to conduct repairs or recovery, the convoy commander should provide trail security and communications.

2. Vehicle Placement: Certain factors influence the placement of vehicles in a convoy. The commander should consider the following guidance in placing vehicles within each convoy element:

- Give special attention to vehicles loaded with ammunition and bulk petroleum. Try to separate these vehicles or disperse them throughout the march elements. A larger gap between vehicles carrying ammunition or bulk petroleum can also be prescribed. Tactically segregate critical supplies to ensure that no one element or capability is lost due to enemy action.

- Position heavier or slower vehicles at the head of the march element to assist in maintaining the prescribed convoy speed and to provide adequate force protection for the entire march element.

- Place command and control (C2) vehicles where they can maintain control of the convoy. Commanders may use an irregular pattern of placing C2 vehicles, or they may use trucks instead of HMMWVs.

- Place maintenance and recovery vehicles at the end of each march unit and at the end of the convoy to recover or make quick repairs to disabled vehicles down along the side of the road. Consider security requirements if personnel must remain back with a disabled vehicle.

- When it will not compromise the security of the convoy, locate trucks requiring the longest unloading time at the head of the march element to achieve the fastest turnaround time.

3. Multiple Vehicle Technique (Four-Vehicle Rule Option): Ambushes and small-scale attacks against vehicles in one theater were identified as a major concern for force protection. As a result, an implemented force protection technique required that all vehicle movement be conducted in elements of no less than four vehicles.

a. Advantages:

- The requirement of four vehicles ensured movements were conducted at platoon level for the mechanized and armored forces since there are four Bradleys or M1A1s in the platoons.

- Regardless of the diversity of units that conducted the movement, at least one vehicle had to have either a M249 SAW or an M60 machine gun.

- Units dedicated time and resources to plan and coordinate the movements, ensuring the minutest details were considered prior to executing a convoy operation — every movement required staff coordination.

- An added benefit of the four-vehicle rule, realized after several mine strikes occurred, was the flexibility provided in a mine incident. The additional vehicles at the mine strike location allowed redundant communications to call for medical evacuation; personnel and resources to conduct internal evacuation, if required; and assets to secure the area during evacuation.

b. Disadvantages:

- It is important to note that many movements, particularly those conducted by non-maneuver units, were not executed by cohesive platoon-sized elements. For example, convoys could consist of a combination of several different organizations, such as civil affairs, psychological operations (PSYOP), military police, and the chaplain.

- The four-vehicle rule limited the leader's ability to move freely in the area of responsibility (i.e., a civil affairs officer, having limited organic vehicle assets, who had to liaison with local officials). If the mission came on short notice, the officer had to quickly coordinate for three other vehicles or identify a convoy traveling to the location of the meeting that was willing and capable of waiting while the meeting took place.

4. Vehicle Hardening Procedures (Prior to Convoy Movement): A hardened vehicle is made less vulnerable to the effects of explosives and small arms fire by adding sandbags, armor plating, ballistic glass, and other protective devices. Hardening may make certain vehicle components and cargo less vulnerable. Its primary purpose, however, is to protect the vehicle's occupants from injury.

When a threat to friendly forces exists within the area of operations, consider the following factors in determining the method and extent of vehicle hardening:

- **Flexibility:** Harden vehicles to provide the proper degree of protection required while maintaining maximum flexibility in its use. Harden the cargo beds of vehicles with sandbags to protect troops.

- **Weight:** All vehicle hardening adds weight to the vehicle. One consideration is to reduce proportionally the amount of cargo that can and should be carried. Another potential challenge is the added vehicle maintenance and durability problems.

- **Availability:** Consider the availability of suitable materials and the time needed to complete the project.

- **Types of roads:** Roads traveled on may determine the amount of hardening protection needed. For example, hardtop roads generally present fewer hazards from mines than dirt roads.

- **Maintenance:** Vehicle hardening normally increases the amount of vehicle maintenance needed. Also, if too much weight is added, it may impact on the vehicle's mobility and operational capabilities.

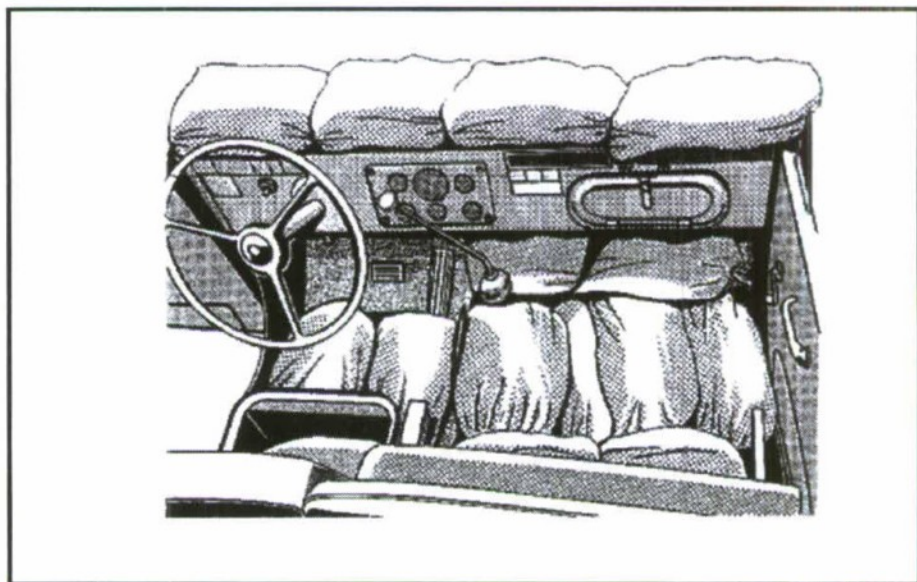
Use of sandbags: Sandbags are effective in reducing the effects of blasts, preventing fire from reaching the driver, and providing protection from small arms fire and fragmentation. Sandbags are usually readily available and do not permanently impair the flexibility of vehicles. Sandbags can be used, generally, in the following areas:

a. **Within the Cab:** Lessons learned reveal that sandbags used to harden vehicle cabs for protection have saved lives. Sandbags should be placed so that they —

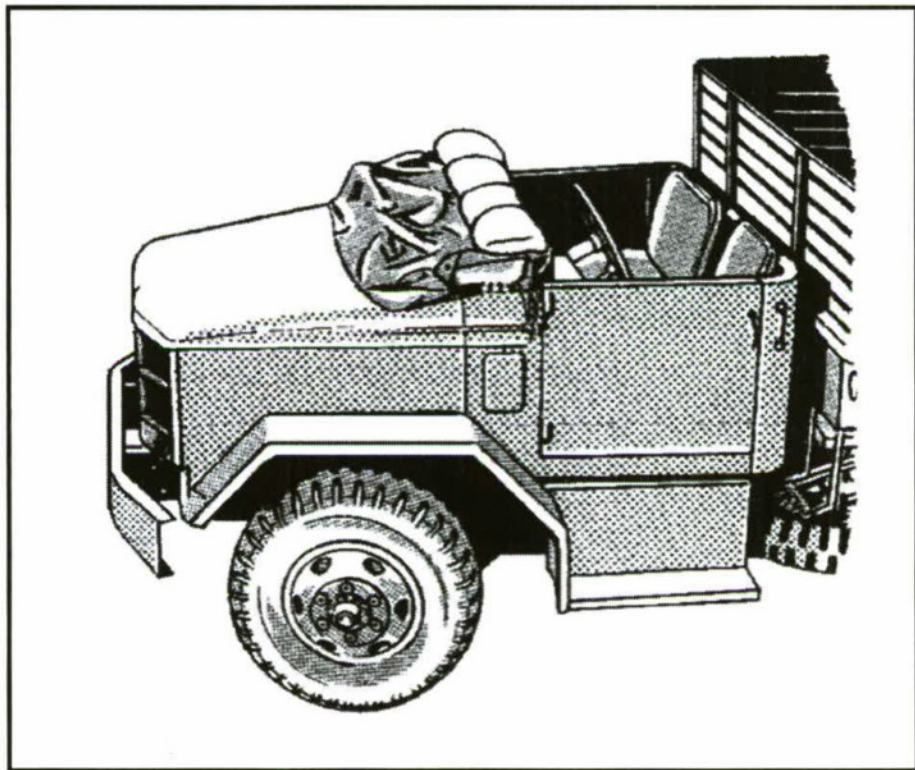
- Do not restrict the movement of foot pedals, levers, or controls.
- Do not interfere with the normal functions performed by the driver.
- Do not restrict the driver's vision.

To reduce the sandblast effect when a mine is detonated near the vehicle, various materials may be placed on top of the floorboard sandbags (e.g., rubber mats, light metal plates, and plywood). Wetting down the sandbags is also effective, but contributes to deterioration of the metal and to the sandbag.

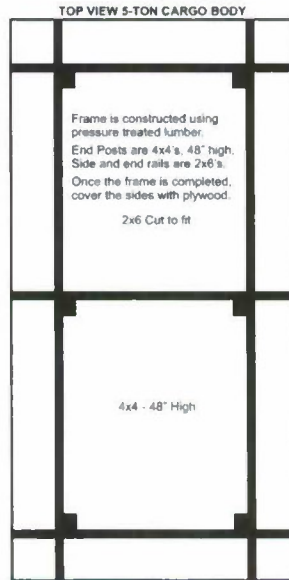
To properly prepare the vehicle cab, double-stack the sandbags under the passenger seat and on the cab floor. Stack the sandbags two high under the driver's seat; in some vehicles this may not be possible. Remove the tools from the BII storage compartment and place them inside the bed. Place sandbags in the storage compartment to give the driver the required protection. As an added precaution, place heavy rubber or fiber matting over the sandbags. This reduces danger from fragments, such as stones, sand, and metal parts from the vehicle.



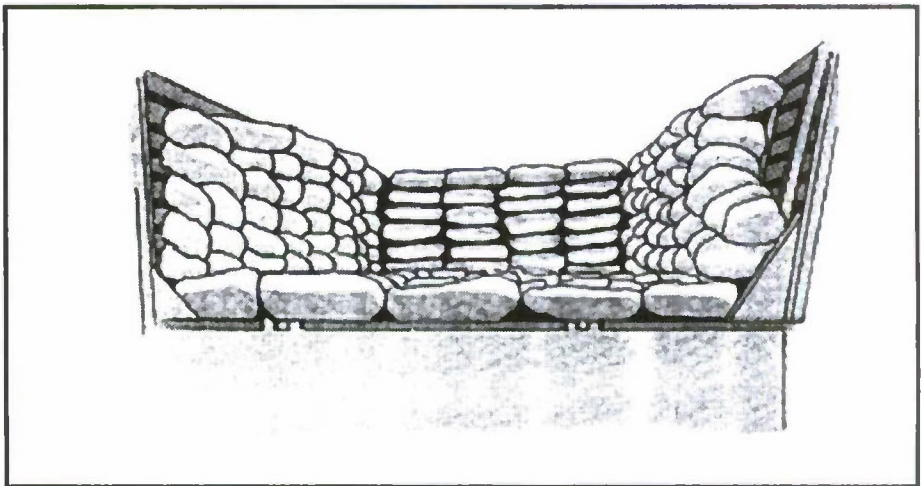
With respect to windows, cover the side windows and the front windshield with wire mesh to protect personnel from rocks and grenades. If possible, place a single layer of sandbags under the windshield, lower the windshield onto the bags, place a second layer of sandbags over the windshield, and then cover both with canvas.



b. **Cargo Bed:** Depending on the type of load carried, the cargo bed may or may not be hardened. For example, if troops are being transported, the bed needs to be hardened with a double layer of sandbags. The bags also need to be properly fitted to the contours of the vehicle. Stack the bags five high around the sides of the vehicle to add protection. To hold the sandbags in place, construct a support structure and place inside the bed of the vehicle. This structure can be made by using four-by-fours on the corners and two-by-sixes in between (see figure on page 61). (Note: Caution must be taken to ensure that the sandbags do not exceed the allowable weight of the vehicle bed. Double stacking increases the possibility of exceeding the vehicle's payload capacity. The considerations mentioned above must determine the extent of hardening.)



On average, it takes about 231 sandbags (dry, weighing about 40 pounds each) to prepare the bed of a five-ton vehicle. Distribution is as follows: 86 on the floor bed (single layer); 5 high on each side (50 per side=100 bags); 20 in the front; and 20 in the rear of the bed.



c. **Fuel Tanks:** Protective plating around the fuel tank will lessen any damage to the tank. It will also assist at ensuring the fuel tank is not pierced, thus immobilizing the vehicle. (Note: A 5-ton cargo truck may require up to five sandbags to provide top protection. Consider placing protective plating around the sides and bottom of the fuel tank to increase protection.)

d. **Maintenance Considerations:** It is common for engine mounts, cab mount bushings, and bolts to loosen. For this reason, they should be checked, tightened, and replaced regularly as part of the daily PMCS. Furthermore, sandbags may become worn or punctured in day-to-day use. They also collect and hold water, causing metal surfaces to rust. Sandbags should be checked periodically and removed or replaced.

(Note: Vehicle hardening tactics extracted from **FM 55-30, Army Motor Transport Units and Operations.**)

5. Immediate Action Drills for Vehicle Convoys:

Use of a Rat Patrol: A rat patrol is an advance security element that precedes a convoy in the absence of an MP or other escort to scout the route, provide overwatch, and possibly prevent the convoy from being destroyed. The fundamentals of a well-exccuted rat patrol are organization, training, planning, pre-combat checks, and rehearsals.

One technique for setting up the rat patrol is to reserve two HMMWVs with two to three heavily armed soldiers per vehicle. These vehicles are not to replace the gun truck or vice versa; they should be used as a complementary force. The convoy commander should use the same soldiers for these rat patrols. The troops get better at the missions and do not have to be trained each time someone orders up a convoy. Better performance means increased survivability for the convoys and the rat patrols.

These patrols need to be well equipped. At a minimum, patrols should have functioning automatic weapons (test fired), communications (rehearsed), binoculars, compass, and a map with graphics. If possible, mechanics should remove the HMMWV's windshields along with the doors and vehicle top to maximize observation and minimize signature due to light reflection. However, caution should be exercised to prevent fragmentations from grenades or IED from entering the vehicle. Mission, enemy, time, terrain, troops available and civilian considerations (METT-TC) will determine if removing the windshield is appropriate.

When running multiple convoys, rotating personnel is crucial. Demands for multiple convoys may mean that rat patrols are single-ship missions. When that happens, use the most experienced and rehearsed team.

How might the enemy attack?

In a 360-degree nonlinear battlefield (noncontiguous), control of key terrain and the entire battlespace may not be possible. In Bosnia, snipers were a major threat to UN aid convoys. A single individual with a long-range rifle can effectively hinder a main supply route. While very few were actually hit, the constant threat of attack forced drivers to mitigating measures which, when implemented, reduced the flow of supplies. Cargo trucks do not offer much protection from any direction, especially overhead. The constant threat adds stress for the drivers as well.

If an enemy force has mortars or anti-tank weapons, the danger is increased. Units should template the range of weapons available to the enemy and determine mitigating factors to reduce risk to the convoy, to include requests for air support, synchronized coordination with a response force, and area security patrols.

Mines or sabotage to the road can simply block a convoy or halt it in preparation for an ambush.

C. Convoy Preparation.

1. **React to Convoy Attack:** Reaction to a convoy attack is an essential battle drill for all drivers. Drivers include not only those designated with a motor transportation MOS, but also anyone whose duties may require them to take part in convoy operations. This includes fuel and water handlers who drive tankers, ammunition handlers, medics in ambulances, and mechanics in wreckers. The enemy does not discriminate when firing on a convoy. Drivers must train on reaction drills constantly so that they do not require conscious thought.

If drivers have to think about what to do, they will probably die in place.

Based on the mission and the enemy situation, the convoy commander has several options that can reduce the threat to the convoy:

a. Night convoys are safer than daylight convoys. Drivers operating with night-vision devices are almost as effective as drivers in daylight, with the benefit of darkness masking the signature of the convoy. In daylight, convoys are easy to spot from far away, giving enemy forces time to prepare and coordinate snipers, mortars, and anti-tank weapons. With clear vision, weapons can be employed at their maximum effective ranges, bringing destruction on convoys with no warning. At night, engagement ranges are reduced, and a convoy using blackout drive is harder to spot. This forces the enemy to get closer to the kill zone and exposes the enemy to a more aggressive counterattack. However, darkness also gives the enemy cover for indirect attacks such as mines and sabotage of the roadway. Deciding when to conduct a convoy depends on careful analysis of the situation using the factors of METT-TC.

b. Request assistance in protecting the convoy. This requires planning and coordination before the convoy departs.

(1) While military police cannot continuously secure a road network, they can conduct periodic sweeps to discourage enemy activity.

(2) The brigade support area (BSA) can provide reaction forces, such as a quick reaction force (QRF) or MP, or the brigade might provide a tactical combat force (TCF) to respond to an emergency on the main supply route (MSR).

(3) Whenever assets are available, support units should put gun trucks into their convoys. Gun trucks can provide suppressive fire to allow the convoy to escape a kill zone, as well as scout potential ambush sites (e.g., known checkpoints).

(4) Request assistance from aviation assets to fly along with the convoy and provide overwatching fires during the movement.

Within the convoy, there are operational considerations to increase the chances for mission success:

a. **Disperse critical cargo** throughout the convoy. This reduces the risk that if an enemy destroys a portion of a convoy, the entire shipment of a particular class of supply might be eliminated. Class III assets, for example, could ignite and explode. With all the fuel tankers kept together, a single tanker exploding could ignite a chain reaction.

b. **Maintain vehicle spacing, even at the halt.** With vehicles spaced 100 meters apart, a convoy would take up over a kilometer of road space. With larger spacing between vehicles, fewer convoy vehicles might get caught in a kill zone. Again, this ensures that the majority of the convoy is outside the kill zone and able to react effectively.

c. Convoy commanders need to **establish primary and alternative means of communication** for the convoy. Most cargo vehicles do not have radios. Dispersed over a kilometer or more of road space, most drivers would not be able to see an attack in another portion of the convoy. The convoy commander must be able to inform the drivers on the location and type of enemy activity so that they can react properly. Signals should be both audible and visual to carry the length of the convoy in both day and night situations.

d. The convoy commander should **designate rally positions** along the route where separated elements can gather to establish a defensive perimeter and regain accountability before continuing the mission.

ARTEP 55-158-30-DRILL sets a standard of 10 seconds for the convoy to recognize an attack and to react appropriately.

a. Each type of attack requires a different response and the location of a vehicle relative to the kill zone also affects the reaction. The key to remember is: A convoy is most

vulnerable when it stops. If a convoy can get past the kill zone or if it can avoid entering the kill zone, then it should be safe.

b. The convoy commander should direct gun trucks or other escort vehicles to deliver suppressive fires on the ambushing forces while vehicles in the kill zone leave it as quickly as possible.

c. The convoy commander should notify higher headquarters of the attack and request reinforcements as quickly as possible.

d. Soldiers trapped in the kill zone should dismount from the side of the vehicle opposite the enemy and take up defensive positions at least 10 meters away from the vehicle. (Note: Determine if the off-road terrain is possibly mined prior to convoy movement.) For them, the battle is now a matter of dismounted infantry tactics.

2. React to Observed Civil Disturbance Not Blocking Route:

- Proceed slowly and observe. Video-record event if possible.
- Report information using Civil Disturbance/Demonstration Feeder Report.
 - * Number of individuals.
 - * Gender makeup (mostly men; children present)?
 - * Are they moving by vehicle/foot?
 - * General attitude of people.
 - * Is there a key speaker/instigator and what is his message?
 - * Are signs or banners present and what is the message?
 - * Is the media on site and whom do they represent?
 - * Are there weapons present?
 - * Who else is present (non-governmental organizations; host-nation personnel)?
 - * Are demonstrators from the area or some other location?
 - * How did the people know about the gathering/demonstration?
 - * What are the people's stated objectives?
- Maintain a presence in the area with overwatch of the disturbance while awaiting further instructions.

3. React to Potential Opposing Force (POF) Blocking Route - Armed:

- Stop as far from POF as possible. DO NOT attempt to bypass POF by leaving the road. Request bypass route on hard paved roads if one is available. If no bypass is available, reposition to create space between convoy and POF if necessary.
- Report to higher headquarters and nearest base camp if possible, using the Feeder Report items above. Video-record event if possible.
- Maintain security. Do not allow the POF to search the convoy. Implement the ROE.
- DO NOT attempt to confiscate weapons or force the POF to disperse. Await the arrival of a combat patrol.

4. React to Air Attack: The air threat varies from unmanned aerial vehicle (UAV), cruise missiles, and armed helicopters to high-performance aircraft. Convoys face the greatest danger of an air attack while moving along open roads or during halts where there is little or no overhead cover.

An air attack is a type of ambush. Accordingly, many of the procedures used during a ground ambush also apply to the air attack. The convoy commander must:

- Prescribe alarm signals.
- Give instructions for actions to take when under attack.
- Prescribe actions to take in the absence of orders.
- Ensure that defense procedures are rehearsed.
- Review the procedures with convoy personnel before the convoy moves out.

a. **Active Defense:** The key to effective small arms fire against aircraft is volume. Put up a large volume of fire with small caliber weapons. Volume small arms fire comes from knowing the effectiveness of small arms fire on low-flying aircraft. Training ensures accuracy and builds confidence.

b. **Firing Positions:** Except for the prone position, the rifleman's basic firing stance stays the same. Maximum use of cover and concealment is essential. A crew-served weapons gunner should fire from a protected position if possible.

e. **Tips For Small Arms Defense:**

- Shoot any attacking aircraft or unauthorized UAV.
- Fire at the nose of an aircraft; fire at the fuselage of a hovering helicopter or slightly above the nose of a moving helicopter.
- Fire in volume — everybody shoots.
- Lead aircraft crossing your position (M-16, M249, or M-60 machine-gun lead jets the length of one football field).
- Take cover if time allows.
- Support your weapon if possible.
- Lie on your back if caught in the open.
- Aim mounted machine guns slightly above the aircraft nose for head-on targets.
- Control small arms fire so attacking aircraft flies throughout it.

d. **Passive Defense:** For a logistical convoy, normally without significant air defense firepower, passive measures are most effective. The key is to prevent attacks by hostile aircraft.

e. **Dispersion:** The formation used by the convoy is a type of passive defense. Factors influencing selection of the best vehicle distance include:

- Mission.
- Cover and concealment along the route.
- Length of the road march.
- Type of road surface.
- Types of vehicles.

- Nature of cargo.
- Enemy threat (ground and air).
- Available defense support.
- Small arms potential.

(1) **Open column:** Open column convoys generally maintain an 80- to 100-meter distance between vehicles. This formation offers an advantage of fewer vehicles damaged by air-to-ground rockets, cannons, or cluster bomb units. However, open columns make control more difficult for the convoy commander when it is necessary to give orders to stop, continue, disperse and seek concealment, or engage aircraft. The column may be more susceptible to attack. It is exposed for a longer period and, if attacked, its defense is less effective since its small arms fire is less concentrated.

(2) **Close column:** Close columns maintain a distance of less than 80 meters between vehicles. This formation has none of the disadvantages noted for the open column formation. However, presenting a bunched-up target could be an overriding disadvantage. Where an air attack is likely, it may be wise for the convoy commander to move close column convoys only at night.

f. **Camouflage and Concealment:** Camouflage and concealment techniques can make it more difficult for the enemy to spot the convoy. Not much can be done to change the shape of a vehicle moving down the road, but the type of cargo can be disguised or concealed by covering it with a tarpaulin. Bulk fuel transporters (tankers) are usually priority targets. Rigging tarps and bows over the cargo compartment conceals the nature of the cargo from the enemy pilot. The following are other effective passive measures:

- The operator should look for a bush, tree, or some other means of concealment to break the shape as seen from the air.
- Smooth surfaces and objects, such as windshields, headlights, and mirrors, will reflect light and attract the pilot's attention. Camouflage or cover all shiny items before the convoy moves out.
- If vehicles are not already painted in a pattern to blend with the terrain and to break the outline, mud can be used to achieve this effect.

g. **Air Guard Duties:** Assign air guard duties to specific individuals throughout the convoy, and give each specific search areas. If the road march lasts more than an hour, soldiers should take shifts at air guard duty. Scanning for a long period dulls the ability to spot aircraft. Seeing the enemy first tips the odds in favor of the convoy, giving it time to react. See FM 44-3, *Air Defense Artillery Employment, Chaparral/Vulcan*, for search and scan procedures.

h. **Communications Security (COMSEC):** Today's communications equipment can be very useful for controlling convoys, but it can also help enemy pilots find you. Use the radio only when necessary and be brief.

i. **Passive Reactions:** When aircraft are spotted or early warning is received, the convoy commander has three options: stop in place, continue to march, or disperse quickly to

concealed positions. If the convoy commander chooses to halt the convoy, the vehicles simply pull to the shoulder of the road in a herringbone pattern. This technique has several advantages:

- It is harder for the enemy pilot to see the convoy when it is halted than when it continues to move.
- It is easy to continue the march after the attack.
- The volume and density of organic weapons will be higher than if the convoy disperses.

A disadvantage to this option is that a convoy stopped on the open road makes a good target, and an enemy attack has a better chance of causing greater damage to the unit.

The mission and/or terrain may dictate that the march continues. If this is the case, convoy speed should be increased. Continuing the march offers the advantage of presenting a moving target, making it more difficult for the enemy to hit. However, detection is easier and volume and density of small arms fire are reduced.

A simple technique to disperse vehicles is to establish a method in the SOP that, in the event of an attack, odd-numbered vehicles go to the left and even-numbered vehicles go to the right. The key to dispersion is not to make two straight lines out of what was one long line; the vehicles must be staggered. This should not be a problem if the drivers have been trained to go to trees, bushes, and folds in the ground that will give concealment. Once the convoy is dispersed, all personnel, except for vehicular-mounted weapon gunners, dismount and take up firing positions.

Advantages to this option are that it is more difficult for the enemy pilot to detect the vehicles and get multiple hits. However, this method has several disadvantages:

- It is easier for the enemy pilot to spot the convoy as it begins to disperse.
- The volume and density of small arms fire are reduced.
- It takes longer to reorganize the convoy after the attack.

5. React to Artillery or Indirect Fire: Enemy artillery units or indirect fire weapons may be used to destroy logistical convoys or to harass and interdict the forward movement of supplies and personnel.

a. **Active Defense:** Active defensive measures against artillery are extremely limited but must not be overlooked. Active measures include:

- Directing counter-battery fire if the direction and approximate distance to the enemy artillery can be estimated.
- Directing small arms fire or artillery fires against the enemy forward observer (FO) if he can be located.
- Coordinating air strikes against the enemy artillery.

b. **Passive Defense:** The formation in which the convoy moves can be a type of passive defense.

- The convoy commander has three options when confronted with incoming artillery rounds: halt in place, continue to march, or disperse quickly to concealed positions. Regardless

of the option selected, the actions to be taken and the signal directing the action should be covered in the unit SOP. The primary consideration is the immediate departure from the impact area.

- The convoy should only be halted when the artillery concentration is ahead of the convoy. The convoy commander should look for an alternate route around the impact area, and the convoy should remain prepared to move out rapidly.
- The mission or terrain may require the convoy to continue. If this is the case, increase speed and spread out to the maximum extent the terrain will allow. Avoiding the impact area, increasing speed, wearing protective equipment, using the vehicle for protection, and increasing dispersion can reduce casualties.

6. React to Sniper Fire: Take extreme caution when sniper fire is received to ensure that any return fire does not harm friendly troops or civilians in the area. The best actions are passive. Ensure all personnel wear Kevlar helmets and available body armor at all times. All vehicles should move through the area without stopping. Escort personnel should notify the march element commander by giving a prearranged signal, such as a smoke grenade thrown in the direction of fire, and attempt to locate and destroy the sniper by long-range fire if in a free-fire zone.

- Prevent convoy personnel from random firing by designating personnel to return fire. Do not return fire in a no-fire zone.
- The convoy commander may order additional fire or supporting forces into the area to destroy, capture, or drive off the sniper. Convoy personnel should be aware that the enemy to slow down a convoy before an ambush frequently uses a heavy volume of fire.
- Remember all details so the incident can be reported to higher headquarters.

7. React to Ambush: No single defensive measure, or combination of measures, will prevent or effectively counter all ambushes in a situation. The effectiveness of counter-ambush measures is directly related to the state of the training of the troops and the leadership ability of the leaders.

The best defense is to avoid being ambushed. Take the following actions to avoid an ambush:

- Select the best route for your convoy.
- Conduct a map reconnaissance.
- Conduct a ground reconnaissance.
- Conduct an aerial reconnaissance.
- Obtain current intelligence information.
- Use operation security to deny the enemy knowledge beforehand of the convoy.
- Do not present a profitable target.
- Never schedule routine times or routes.

Take the following actions to reduce the effectiveness of ambushes:

- Harden vehicles.
- Cover loads.

- Space prime targets throughout the convoy.
- Wear protective clothing.
- Use assistant drivers.
- Carry troops and supplies.
- Use prearranged signals to warn the convoy of an ambush.
- Use escort vehicles (military police, tanks, armored vehicles) or gun trucks.
- Thoroughly brief all convoy personnel on immediate action drills.
- Practice immediate action drills.
- Maintain the interval between vehicles.
- Move through the kill zone, if possible.
- Stop short of the ambush.
- Do not block the road.
- Rapidly respond to orders.
- Aggressively return fire.
- Counterattack with escort vehicles.
- Call for artillery support.
- Call in tactical air (TACAIR) support.
- Call for the reserve force.

In the event of an ambush during night convoy operations under blackout drive, turn on service drive lights and increase speed to clear the ambush area. Be aware that drivers wearing night-vision goggles will be temporarily blinded when the service drive is turned on.

a. **Road Not Blocked:** Guerrillas are seldom able to contain an entire convoy in a single kill zone. This is because of the extensive road space occupied by even a platoon-sized convoy and because security or lack of available forces may limit the size of the ambushing force. More often, a part of a convoy is ambushed — the head, tail, or a section of the main body. That part of the convoy that is in the kill zone and receiving fire must exit the kill zone as quickly as possible if the road to the front is open. Vehicles disabled by enemy fire are left behind or, if blocking the road, pushed out of the way by following vehicles. Armored escort vehicles must not block convoy vehicles by halting in the traveled portion of the road to return fire. Vehicles that have not entered the kill zone must not attempt to do so. They should stop and personnel should dismount, take up a good defensive position, and await instructions. Since escort vehicles may have left the road to attempt to overrun a hostile position, elements of the convoy should not fire on suspected enemy positions without coordinating with the escort forces.

Other actions that convoy personnel can take to neutralize the ambush force include:

- Call for artillery fire on enemy positions.
- Call for gunship or TACAIR or Army aviation fire on enemy positions.
- Direct gun trucks and other vehicles mounted with weapons to lay down a heavy volume of fire on the ambush force.
- Call for reaction forces.
- Direct all non-driving personnel to place a heavy volume of fire on enemy forces as rapidly as possible as vehicles move out of the kill zone.
- Direct vehicles to keep their distance to reduce number of vehicles in the kill zone.

A motor transport convoy with a limited escort is seldom able to defeat a hostile force and should not attempt to do so. When part of the convoy is isolated in the kill zone, vehicles that have not entered the ambush area should stop. Personnel should dismount, take up a good defensive position, and await instructions until supporting forces have cleared the ambush. Normally, a transport unit will not deploy to attack a hostile force unless it is necessary to prevent destruction of the convoy element. It relies on supporting air, artillery, escorts, and reaction forces.

b. Road Blocked: When an element of a convoy is halted in the kill zone and is unable to proceed because of disabled vehicles, a damaged bridge, or other obstacle, personnel will dismount, take cover, and return a maximum volume of fire on enemy positions. When dismounting, exit the vehicle away from the direction of enemy fire. Security/escort troops from vehicles that have passed through the ambush area dismount and lay down a base of fire on the ambush position. Reaction forces should be called in as soon as the ambush attack is launched.

When a security escort is provided and a combat emergency arises, the escort commander has operational control of the security element to attack and neutralize the hostile force. Normally, the security force will take action to neutralize the ambush while the convoy escapes from the kill zone. In an ambush situation, immediate reaction and aggressive leadership are essential to limit casualties and damage to vehicles, cargo, and personnel. If immediate air or artillery support is available, personnel will be restricted to a specified distance from the road to avoid casualties from friendly fire. In this situation, personnel in the kill zone establish a base of fire, while others take up defensive positions away from their vehicles and wait while supporting fire is called in on the enemy positions. Fire in the kill zone may be from only one side of the road with a small holding force on the opposite side. To contain the convoy element in the kill zone, mines and booby traps are frequently placed on the holding force side. The security escort must take care in assaulting the main ambush force, as mines and booby traps are commonly used to protect its flanks.

When the enemy is dislodged, the road must be cleared and convoy movement resumed as soon as possible. Wounded personnel are evacuated using the fastest possible mode. When disabled vehicles cannot be towed, their cargo should be distributed among other vehicles if time permits. When it is not feasible to evacuate vehicles and/or cargo, they will be destroyed upon order from the convoy commander. If at all possible, radios and other critical items will be recovered before the vehicles are destroyed. Under no circumstances will they be allowed to fall into enemy hands.

c. Mines, Booby Traps, and Improvised Explosive Devices (IED): Mines, booby traps, and IEDs are frequently part of an ambush. Command-detonated mines are often used to start an ambush. Mines will also be planted along the shoulder of the road for harassment and interdiction. A booby trap system may be used against personnel in vehicles and could consist of hand grenades. Claymore mines or artillery shells may be suspended from trees and command-detonated when a vehicle passes. The following guidelines have proven effective in decreasing damage by mines in convoy operations:

- Track the vehicle in front.
- Avoid driving on the shoulder of the road.

- Whenever possible, do not run over foreign objects, brush, or grass in the road.
- Avoid fresh earth in the road.
- Watch local national traffic and the reaction of people on foot. They will frequently give away the location of any mines or booby traps.
- When possible, arrange for the engineers to sweep the road immediately before the convoy is scheduled to move over it.
- Use heavy vehicles, such as tanks, in front of the convoy to explode small mines.
- Harden vehicles.
- Wear protective equipment (Kevlar).

(Note: Another excellent source for convoy operations is **CALL Handbook No. 03-6, *Tactical Convoy Operations***.)



CHAPTER 3

FLIGHT OPERATIONS IN URBAN AREAS

“Adapt, Migrate or Die” – Charles Darwin

The following TTP and lessons learned are important factors for commanders to consider when planning and executing aviation operations in Southwest Asia (SWA). These TTP are taken from the CALL database on recent operations in Kosovo, Afghanistan, and Iraq, and from lessons learned from our allies. The primary doctrinal references used are FM 3-06, *Aviation Urban Operations*; FM 3-06.11, *Combined Armed Operations in Urban Terrain*; FM 1-111, *Aviation Brigade*; FM 1-112, *Attack Helicopter Battalion*; FM 1-114, *Air Cavalry Squadron and Troop Operations*; and FM 17-95, *Cavalry Operations*. U.S. soldiers can use these lessons learned to successfully plan and execute the full spectrum of aviation missions.

A. Characteristics of Aviation Urban Operations.

- Urban areas directly affect weather, especially wind patterns.
- The numerous buildings and streets and few map references complicate navigation over built-up areas. Flight routes over urban terrain may increase employment time and fuel consumption.
- Buildings limit maneuverability and engagement ranges.
- Urbanized terrain may limit forward arming and refueling point (FARP) size, location, and response times.
- Extensive urban sprawl and high buildings degrade communications and may require extensive relay and retransmission sites.
- Urbanized terrain masks intelligence and electronic warfare acquisition capabilities.
- Landing and pickup zones may be severely limited; operations from rooftops may be required.
- Aviation units face increased hazards to flight operations — towers, wires, and antenna hazards.
- Night-vision system degradation due to city lights and thermal imagery challenges in the city.
- High risk to aircraft from close-range, small-arms fires, complicated by the close proximity of both friendly forces and non-combatants.
- Degraded visibility and possible toxic fumes when flying near or through smoke and dust.

B. “Rules to Live By” for Aviation in Urban Operations.

- **Avoid urban areas.** Operate in urban areas only when the mission dictates it. If the mission dictates operations in urban areas, have a thorough knowledge and understanding of the key terrain (e.g., intersections, roads, hospitals, schools, cultural and religious buildings, and municipal buildings), flight routes in and out of the area of operations (AO), and flight hazards (e.g., towers, wires, canals, and power lines).

- **Get in and out quickly.** Minimize the time spent over urbanized terrain. Ingress and egress the area by different routes that minimize the duration of flight over urbanized terrain. Fly at medium to higher airspeeds, depending on altitude and hazards, to decrease the opportunity for engagement by ground weapons.

- **Do not be predictable.** Alternate flight routes and checkpoints. Plan egress and contingency routes, rally procedures, and backup navigation techniques. Vary your times.

- **Minimize your signature.** Take maximum advantage of flight profile options and existing conditions to lessen the risk of acquisition and engagement. Plan and execute the mission with maximum emphasis on aircraft signature reduction.

- **Know the current situation.** Insist on the most current information available regarding friendly forces, the enemy, and hazards. Update information prior to takeoff, en route to the objective, and continuously during the mission.

- **Establish communications with all players.** Determine net information for all participating and supporting elements. Establish communications with ground maneuver elements as soon as possible en route to the objective.

- **Think before you shoot.** Develop a clear understanding of the friendly situation before you engage targets to minimize fratricide. Ensure that the identify friend and foe (IFF) and aircraft survivability equipment (ASE) is working, and know the purpose and demarcation lines for IFF and ASE.

TECHNIQUE: Once the ADA threat is suppressed, fly at higher altitudes to avoid small arms fire. Use a methodical approach to urban areas and do not fly over the city until friendly ground forces have swept it.¹

C. Aviation Route Planning and Navigation.

- Navigation in the city can be overwhelming because of the over abundance of visual cues.

- Use vertical and linear references to distinguish en route checkpoints. Radio towers, tall buildings, or unique city features (parks, malls) can assist the aircrew with their navigation. Linear cues, such as roads, highways, and rivers through a city, can also assist the crews with navigation.

- Obtain maps with the proper information for both navigation and synchronization with the ground maneuver elements. (Photomaps of the village/town/city are great tools.)

- Use an area sketch for target areas or objectives. The area sketch simply identifies the natural and man-made features in the area and codes them with letters, numbers, or code words. Identification of both targets and friendly unit location is much easier with both air and ground units using the same area sketch.

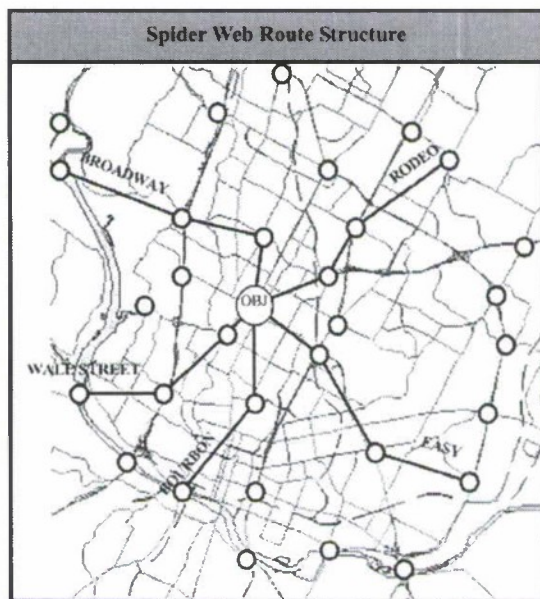
- Convert civilian maps to the military grid reference system (MGRS). Civilian maps also include the names of streets and key buildings, locations, and terrain within the city.

- Navigation in the city is also affected by the abundance of lights in urban areas that degrade night-vision devices. Develop a system of routes that follow easily identifiable features.

- Familiar landmarks may disappear, become covered with rubble, or be obscured by smoke and dust during the fight.

- Use the "spider web" concept to construct a route structure throughout an urban area. Air control points (ACP) are placed on easily identifiable features and then linked together to

form the route. The spider web concept provides for many different routes and variations of routes using established checkpoints. This ability to vary routes adds unpredictability to flight missions.



D. Landing Zone (LZ)/Pickup Zone (PZ) and Forward Arming and Refueling Point (FARP) Selection in an Urban Environment.

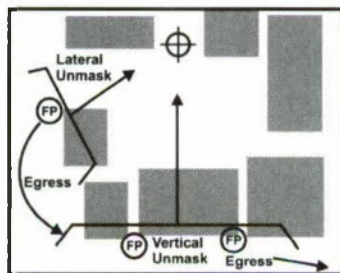
- Aviation planners must look at all available products to find suitable sites for LZs, PZs, and FARPs.
- City maps, overhead imagery, and even reconnaissance flights will help the unit select proper sites.
- Consider the use of city parks, parking lots, stadium fields, and athletic fields.
- Major highways and large multilane roads offer potential LZ, PZ, and FARP sites if civilian traffic is not using them.
- Lighting at the LZ is a factor. If the city is not blacked out, city lights will affect the night-vision goggles used by the pilots. If the LZ is large or has multiple turns, consider using pathfinders or air traffic services to control the PZ or LZ.
- Antennas, light poles, debris, wires, and enemy locations are hazards at MOUT landing sites.

- Winds may change direction because of buildings and built-up areas. Tall buildings may funnel winds through the streets, causing a much higher wind condition than briefed.

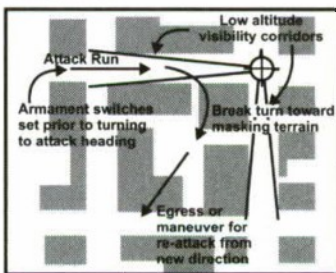
E. Aviation Direct Fire Planning Considerations and Techniques.

- Urban terrain is severely canalized which causes severely limited fields of fire.
- Streets limit target views to a narrow corridor along the street or from high angles over buildings.
- Expect enemy forces to utilize the near sides of buildings, putting them out of view.
- Expect targets to move rapidly from cover to cover and require quick engagement.
- Direct fires are provided from battle positions (BP), attack-by-fire positions (ABF), or support-by-fire positions (SBF).
- The threat to aircraft is lessened when firing from the friendly side of the battlefield.
- When forced to fight and fly over areas where the enemy has not been cleared, it is better to keep the aircraft moving and make it a harder target to hit.
- Consider conducting running fire engagements from an initial point (IP), engaging the target, and returning to a safe area to regroup for another attack. The lead wingman concept is excellent for this type of attack where the wingman can suppress the target after the lead man's engagement and "cover his break." Running fire, aircrews must prevent over flight of friendly units.
- Coordination is required with ground units to suppress the enemy's fire to protect the aircraft during their attack. The 30-mm on the AH-64, .50-cal on the OH-58D, and the 2.75-inch rockets fired by both aircraft are ideal for this attack.
- Precision-guided weapons, such as the Hellfire missile, can be used in congested urban terrain; however, their capabilities are limited. Aircrews can expect short-range Hellfire engagements and may have to reposition many times and seek out the best angle for attack.
- Hovering fire allows aircrews to unmask both laterally and vertically from behind cover, but is not recommended in urbanized terrain because aircrews must maneuver within 2,000 meters to get "eyes on" the target.

Spider Web Route Structure

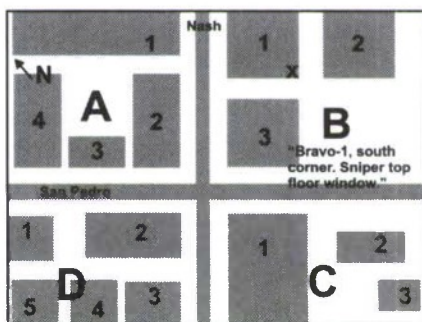


Hovering Fire Engagement

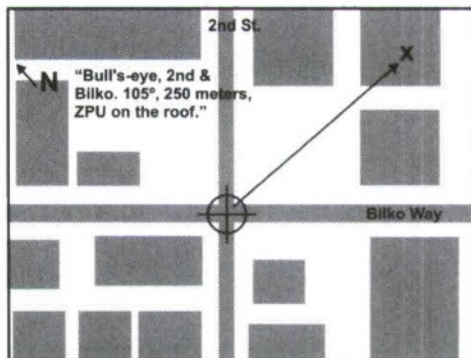


Running Fire Engagement

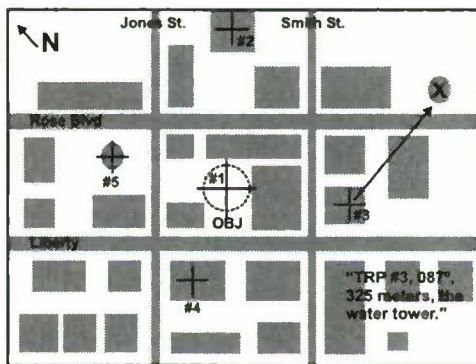
- The urban targeting grid system is a technique that divides up the urban area into specific grid sectors. A number or letter identifies each building. Coding the corners of the buildings facilitates rapid fires.
- The target handover to the aircrew is simply the location from the grid system and a brief target description.
- Both the aircrew and the ground unit must have the same urban targeting grid for effective coordination to occur.



- The bull's-eye targeting technique gives the aircrew a specific point and reference target location from that point. The "bull's-eye" must be a point that is easily recognizable for both the unit in contact and the aircrew flying the attack mission. The bulls-eye may be preplanned or given to the aircrew on-site. As long as the aircrew and the ground unit are working from the same map or both are familiar with the area, bull's-eye targeting is very effective. The target handover to the aircrew is simply a distance and direction from the bull's-eye and a target description.



- Target reference points (TRPs) are tools that both air and ground units can use to coordinate fires. TRPs are easily recognized points on the ground (either natural or man-made) used to initiate, distribute, and control fires. TRPs are designated by maneuver leaders to define sectors of fire or observation. TRPs can also designate the center of an area where the commander plans to converge or distribute the fires of his weapons rapidly. The target handover is similar to bull's-eye targeting: a distance and direction from the TRP and a brief target description.



F. Aviation Weapons Effects.

- Urban targets are usually hard, smooth, and contain flat surfaces. Rounds fired from the air strike the surface at an angle and tend to ricochet, causing impact-fused weapons to not detonate.

- Targets rarely present themselves for extended periods of time. Aircrews can expect short target exposure and rapid engagements. Aircrews must be constantly on the lookout for targets and be ready to engage rapidly. Expect enemy-held structures to be covered by fire.

- Expect dead space within urban areas. Large, tall buildings and narrow streets create dead space that aircrews cannot engage.

- If enemy units are in buildings, the buildings must be attacked first to get to the soldiers inside. Weapons that can break through walls must be used.

- Weapons found on attack aircraft designed to destroy vehicular targets and troops in the open are also effective in the urban environment.

- TOW, Hellfire, and 2.75-inch rockets produce effects on structures found in the city.

- Precision-guided munitions, TOW, and Hellfire give the aircrew the ability to target specific windows, floors, or sections of a building.

- Rockets produce effects on structures and are also effective on troops in open streets.

- HE rockets produce the best effects on buildings.

- Smoke rockets are used to mask friendly movement.

- Flechette rockets are ideal for clearing rooftops or attacking troops in the open.

- The gun systems on attack aircraft are also effective when used to clear rooftops and troops in the open, or fired on the front of buildings and into windows.

TECHNIQUE: AH-64 chain gun (30-mm) - Use manual ranges of 300 meters in the city and 800-1,000 meters in open terrain.²

(Note: Consult the *Joint Munitions Effectiveness Manual* for information regarding the effect of weapons on targets.)

G. Operational Phases. Urban operations doctrine has divided a deliberate attack on a city into five distinct phases: (1) Reconnoiter the objective, (2) Move to the objective, (3) Isolate the objective, (4) Secure a foothold, and (5) Clear the objective. Aviation units (attack battalions, cavalry squadrons, and assault battalions) can expect missions during each phase of the attack. Aviation units conducting direct fire in urban terrain will find it differs greatly from open terrain. In open terrain, attack and cavalry aircraft can engage at maximum ranges, while engagements in urban terrain are usually at close range and in close proximity to friendly units.

1. Phase I: Reconnoiter the Objective

- Aviation units assist the ground unit commander in a thorough route, area, and zone reconnaissance of the objective to complete the attack plan.

- Conduct route reconnaissance of the routes leading to and from the urban area (both ground and air).

- Conduct zone reconnaissance of the areas around the city.

- Conduct area reconnaissance of key terrain or areas leading to the city.

- Conduct hasty attacks on enemy units found during this phase of the operation.

- Provide security during insertion for scout and long-range surveillance teams.

- Support insertion of ground scouts; insert low-level voice intercept (LLVI) teams, ground sensors, and ground surveillance radar teams.

2. Phase II: Move to the Objective

- Continue aerial reconnaissance operations to detect enemy forces, positions, and obstacles and prevent them from interfering with the attack plan.

- Support air assaults with area reconnaissance of both air route and landing zones/pick-up zones (LZ/PZ).

- Conduct a screen of a moving force as the ground units move along their attack routes into the urban area.

- Conduct a force-oriented zone reconnaissance to locate and defeat enemy forces along the route or in areas that can influence the ground scheme of maneuver.

- Continue to identify routes or confirm that previously cleared routes are still free of obstacles.

- Conduct hasty attacks on enemy units and positions.

- Support repositioning of ground forces to assault positions.

- Support movement of supplies by air.

- Continue to insert and reposition ground scouts.

- Deploy Volcano minefields to fix forces.
- Conduct casualty evacuation (CASEVAC) and combat search and rescue (CSAR).
- Conduct command and control (C2) missions.

3. Phase III: Isolate the Objective

- Isolate the objective to prevent the enemy from escaping or reinforce the urban area.
- Conduct screens to provide early warning of incoming enemy forces that are attempting to reinforce the city.
 - Help develop the situation.
 - Destroy enemy forces.
 - Assist with battle handovers.

4. Phase IV: Secure a Foothold

- Securing a foothold involves seizing an intermediate objective that provides cover from enemy fire and a place for attacking troops to enter the built-up area.
- Conduct area reconnaissance to determine possible enemy forces, weak points, flanks, and enemy composition.
 - Mass aviation fires to assist ground units with establishing a foothold.
 - Conduct area security, reconnaissance, or other security missions to maintain the isolation of the urban area.
 - Provide suppressive fires from attack by fire (ABF), support by fire (SBF) or battle positions (BP).
 - Employ precision fires to destroy enemy armor on high-speed avenues of approach into the city.
 - Coordinate with joint air attack teams (JAAT) to destroy armored forces securing the breach point.
 - Provide laser identification of targets.
 - Provide security for assault units that transport ground forces to the area.
 - Continue to conduct reconnaissance, security, and hasty attacks to maintain the isolation of the city.

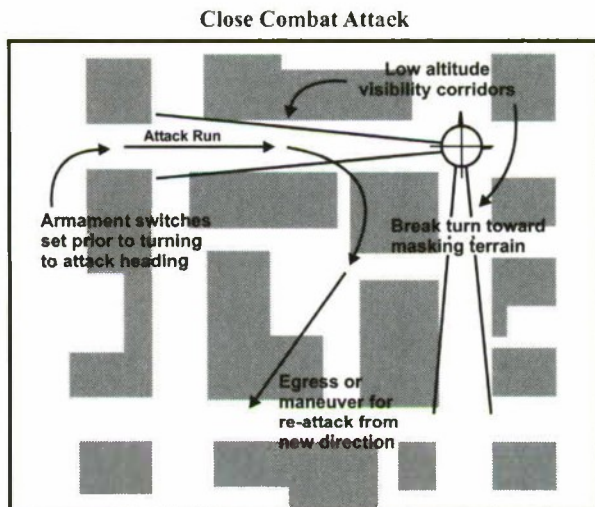
5. Phase V: Clear a Built-up Area

- Characterized by systematic house-to-house fighting as ground forces attempt to force the enemy from the city.
 - Continue isolation of the city operations.
 - Conduct reconnaissance and security operations in the city in support of the ground units in contact.
 - Air operations in the city are best performed by small units/lead wingman teams.
 - Aviation units that assist ground units in contact must have an understanding of the weapons system's effectiveness against urban targets.
 - Units in contact must accurately mark their location and the target's location during both day and night conditions.

- Screen outside the city to prevent reinforcements from arriving or the enemy resupplying the city.
- Conduct reconnaissance within the city that supports assault units or repositioning forces, or conducting aerial resupply.
- Conduct deliberate and hasty attack missions under control of the unit in contact. It is critical that the attack units have communications with the unit in contact.
- Conduct resupply operations and air movement of troops.
- Expect LZs in large parking lots, city parks, athletic fields, and even on buildings.
- Support air assault operations to clear pockets of resistance throughout the city.
- Support CASEVAC and CSAR missions.

H. Close Combat Attack (CCA) Technique. Close combat attack is defined as a hasty or deliberate attack in support of ground units engaged in close combat. During CCA, armed helicopters engage enemy units with direct fire that impact near friendly forces. Targets may range from a few hundred meters to a few thousand meters. CCA is coordinated and directed by team-, platoon- or company-level ground unit soldiers.³

- As enemy elements seize key features (particularly vertical structures), the air defense threat escalates within the urban area.
- CCA is a procedure that is very similar to running or diving fire and ensures aviation fires destroy the enemy with minimal risk to friendly forces.
- The CCA technique allows aviation attack teams of two or three OH-58Ds or AH-64s to engage targets with a greater degree of accuracy and protection than they could with hover fire.
- CCA requires ground and aviation leaders to positively identify the target and coordinate the attack timing and direction.
- The aircrews fly at nap-of-the-earth (NOE) altitudes at airspeeds of 80-100 knots.
- Approximately 300-1,000 meters out from the target, the aircrews execute a cyclic climb to an altitude of 100-300 feet.
- At the specified altitude (threat/terrain dependent), the aircraft is "nosed over," and the aircrews immediately engage the target with 2.75-inch rockets or machine-guns.
- After employing their weapon systems, the aircrews break left, break right, or fly straight ahead.
 - * Breaking left or right exposes the larger side profile of the airframe to enemy fire.
 - * Flying straight ahead exposes the crew and aircraft to the effects of the ordnance they just fired or they may overfly previously undetected enemy forces.
 - * Depending on the tactical situation, it is best for the aircraft to break hard to one side and return to NOE flight immediately.
- The fires from the second helicopter as it begins its firing run aids the first helicopter's egress from the target area by forcing the enemy to keep their heads down.



I. Air-Ground Coordination Techniques.

- The key to success for enhancing air-ground coordination and the subsequent execution of the tasks requires an SOP between air and ground maneuver units that addresses hasty attacks in a close combat situation.
- Effective integration of air and ground assets begins with the ground element.
- Plan for and expect minimal planning time.
- Initial information provided should be sufficient to get the aviation team out of its own assembly area.
- A holding area is located in the sector of the ground unit involved in close combat.
- Designate alternate holding areas, along with ingress and egress routes, if occupation is expected to last longer than 15 minutes.
- En route to the holding area, the aviation team leader contacts the ground unit to verify the location of the holding area, update information on enemy and friendly, and conduct additional coordination.
- Coordination and communication begins with the requesting unit command post (CP) and ends with the leader of the lowest level unit in contact.
- The aviation team leader provides the infantry unit leader with the team's present location, estimated time of arrival (ETA), the composition of the attack team, the armament load and weapons configuration, and total station time.
- The infantry unit leader, in turn, provides the attack team leader with:
 - * His maneuver plan.
 - * Updates on enemy composition and disposition.
 - * Location of his forces and supporting artillery or mortar positions.

- * Most recent activities.
- * Location of known air defense weapons.
- * Update on the friendly situation.
- * Method for marking friendly positions.
- The infantry unit leader provides a description of the target.
- The infantry unit leader provides a location of the target using geographical terrain features and smoke rounds from artillery or mortars already impacting on the target area, illumination or tracer rounds, or other ground fires to provide a reference mark on the target.
 - The attack team leader then informs the infantry unit leader of the battle position, attack-by-fire position, or the series of positions his team will occupy that provides the best observation and fields of fire into the engagement or target area.
 - The battle position or attack-by-fire position is a position from which the attack aircraft will engage the enemy with direct fire.
 - The battle position or attack-by-fire position is normally offset from the flank of the friendly ground position to ensure that rotor wash, ammunition casing expenditure, and the general signature of the aircraft does not interfere with operations on the ground.
 - The attack team leader then provides the infantry unit leader with his concept for the team's attack on the objective.
 - Only on completion of coordination with the lowest unit in contact does the flight depart the holding area for the battle position.
 - As the attack team moves out of the holding area, it uses NOE flight to mask itself from ground enemy observation and enemy direct-fire systems.
 - The attack team leader maintains communications with the infantry unit leader while he maintains internal communications on either his very high frequency (VHF) or ultra-high frequency (UHF) net.

J. Marking Targets and Friendly Positions in Urban Combat.

- Aircrews require positive identification of the target and friendly positions prior to releasing ordnance.
- The methods to mark friendly and enemy positions are limited only by the creativity of the ground forces and aircrews.
- Methods and techniques employed must be adapted to the conditions prevalent at the time.
- Some proven techniques for signaling or marking friendly positions include:
 - * Spray paint or bed sheets hung out of windows.
 - * Traditional but simple signaling devices, such as flares, strobes, and signaling mirrors.
 - * Use of glint tape, combat identification panels (CIPs), and infrared beacons.
- Some proven techniques for target marking or orientation on enemy positions include the use of smoke grenades, laser pointers, tracers, or smoke from indirect fires.
- Fixed-wing gunships and rotary-wing aircraft should expect detailed continuing directions, including reference points, to the target in addition to standard range and bearing.

- Aircrews and terminal guidance controllers must become familiar with the roof outline of buildings. Flat roofs, pitched roofs, domed roofs, and roofs with towers or air conditioning units on top will aid in acquisition, visually and thermally.

K. Aircrew Urban Threat Considerations.

- Every building and structure in an urban area is a potential enemy position.
- The presence of snipers increases the vulnerability to ambush.
- The difficulty in distinguishing combatants from non-combatants places participants under additional psychological stress.
- The defending force normally has the advantage of familiarity with the terrain.
- Aircraft are more vulnerable to low-tech weapons in urban combat.
- Urban terrain provides excellent cover and concealment for a variety of weapon systems. Coupled with the restrictions on airspace available for maneuver, this makes these weapons a more significant threat to aircraft than they normally are in open terrain. Some of these weapons include:
 - * **Tank main gun:** Modern fire control systems permit effective aircraft engagement by tanks with their main gun. The development of effective anti-helicopter ammunition, such as the U.S.-fielded MPAT (multi-purpose anti-tank round), includes an air/ground fuse.
 - * **Anti-tank guided munitions (ATGMs):** Most ATGMs have an effective range between 3,000 and 5,000 meters and can engage helicopters in the same way they engage ground targets. ATGMs are a threat to rotary-wing aircraft in an urban environment due to the restriction and compression of airspace and operating closer to potential threat positions.
 - * **Anti-armor rockets:** Anti-armor rockets, such as the light anti-tank weapon (LAW), AT-4, and rocket-propelled grenade (RPG), are readily available, inexpensive, and normally standard equipment at the small unit level, even in irregular forces. They are unguided and have effective ranges less than 500 meters and are a real threat to rotary-wing aircraft.
 - * **Medium cannons:** Many armored personnel carriers (APC) and infantry fighting vehicles (IFV) carry rapid-fire cannons ranging from 20-mm through 40-mm, and are effective against rotary-wing aircraft.
 - * **Small arms and machine-guns:** Small arms and machine-guns can also become a more significant threat in an urban environment. Generally, 5.56-mm and 7.62x39-mm rifles are effective out to 500 meters, 7.62-mm machine-guns and sniper rifles of similar caliber are effective to 1,000 meters, and .50-cal/12.7-mm machine-guns and sniper rifles are effective to 2,000 meters. Another consideration is that these weapons can be placed on the upper floors of buildings above the helicopters to fire down on the helicopters. Since these are small, light weapons, they can be easily moved to unexpected positions easily.

L. Reconnaissance Operations. Southwest Asia's varying terrain poses several challenges for aircrews conducting reconnaissance missions. There are a wide variety of small villages/towns and named areas of interest (NAI) in flat areas as well as nestled on a hill or arrayed on both

sides of a valley. These areas make a clear field of view (FOV) for observation very difficult and sometimes unavailable without having an aircraft fly right up to or over the reconnaissance objective.

1. Recommended employment technique for OH-58D aircraft (urban area with mountainous terrain). In order to gain the valuable observation of the target area or to confirm or deny activity in the urban area, it may be necessary to utilize the following:

- **The Aviation Mission Planning Station (AMPS) of Falcon View to check the line of sight (LOS)** from a vantage point close enough to the reconnaissance objective without compromising security for the aerial weapons team (AWT).

- **Overlapping FOVs.** Overlap the FOV of the AWTs from different angles to the target. By choosing a series of OPs surrounding the objective area, the AWT will be able to cover two of the cardinal directions while still providing security to the other aircraft if needed. Keep movement between the lead and wing aircraft to provide total observation and gain situational awareness. It may become necessary to place the lead aircraft at a vantage point higher than the target to see the topside, and the wing aircraft at the bottom side of the target in order to gain observation of the entire target.

- **Obstacle FOV.** Conducting the technical map reconnaissance, in conjunction with the AMPS LOS, is a proven method to gain observation during the planning phase. The only caution to gaining the best vantage point to the objective is taking into account the vegetation and man-made structures that become a hindrance to the LOS. There are times the best FOV is accomplished by checking the rise-over-the-run and keeping the AWT high enough to maintain the observation. At times it may be prudent to be deceptive and maintain a constant flight path past the objective area, with the attitude to the aircraft flying abeam the target, employing the azimuth of the mast mounted sight (MMS) on the target. This technique works well in restrictive terrain locations, spurs, and in valleys where the only observation may be right over the target because the FOV is obstructed by natural or man-made obstacles.

- **Keep constant movement between the AWTs.** This allows the team to gain situational awareness of the entire reconnaissance area. The natural response of people is to look up and on the high ground when they hear the audible sound of an aircraft. Employing one aircraft on the high ground and drawing the attention of the villagers provides the lower aircraft the opportunity to gain observation and movement in and around the objective without drawing attention to itself, and still be in position to support when required. Employ the "fly-by" reconnaissance in locations where OPs do not provide the best observation.

2. Recommended employment technique OH-58D (urban area with flat terrain). To gain the observation of the target area in this type of environment, it may be necessary to employ the following:

- **Maintain a constant orbit around the objective.** This technique provides the AWT 360-degree observation and affords LOS on different axis of view in and out of the reconnaissance area. The distance between the lead and wing aircraft may vary depending upon the size of the area, but as the lead aircraft is conducting a turn looking down a road, alley, or linear area, the wing aircraft can support/backup the FOV from the reverse side. It becomes critical to employ the on-board systems and MMS to augment the visual cues the aircrew

employs to acquire targets. This technique assists in reducing the dead space/unobserved areas the lead aircraft may not be able to view after passing a location on the ground. It is still the wing aircraft's responsibility to "follow and support" with suppressive fires or observation at a distance to the lead aircraft with enough reaction time to influence a situation.

- **Alternating a right or left orbit around the objective.** When the standoff distance is greater than 1,500 meters or so, conduct a left orbit around the reconnaissance area. The copilot observer employs the MMS to search the area in different FOVs, and provides reconnaissance information on the objective area with the use of the onboard systems at a standoff distance. When the reconnaissance requires the AWT to move in closer in order to gain a more detailed picture or support a ground element, change the rotation around the target to a right orbit. This technique allows the aviator in the right seat to have observation on targets at a closer range to employ suppressive fires quickly and to guide ground elements onto a target. Cross talk between the aircrew is important to delineate between what targets are primary and alternate, but the employment of suppressive fires and direct movement for the ground forces at this point becomes largely the responsibility of the right seater as forces are moving on the ground.

- **Conduct observation at a higher vantage point and slower airspeeds.** Recognizing the obstacles of an urban flat area and the built-up features that obstruct an FOV, the AWT has to adapt to the obstructions and gain observation by flying at a higher altitude above the ground and operate at slower airspeeds. Employing these two techniques allows the AWT to view the ground floor of buildings, roads, or open areas that would be obstructed by some other natural or man-made obstacle. A small row of roadside trees or a two- or three-story building is an obstruction when attempting to gain observation on a location where activity may occur. By increasing the flight path above ground level (AGL), the AWT now has an advantage over unobserved locations. Increasing the AGL observation, coupled with reducing the airspeed, only increases the amount of time the AWT can maintain observation of a target.

M. Employment of Lasers.

1. **Air-to-ground laser use.** The Kiowa warrior community uses an AIM-1 infrared (IR) marking system normally mounted on the .50-cal machine-gun to provide a direct red beam onto a target when viewed under a night-vision device (NVD). The AIM-1 laser has been removed from the .50-cal and placed inside the cockpit for the copilot to use as a marking tool. The copilot has the AIM-1 on a lanyard and employs it to identify a target during an air-to-ground "walk on" of a target. The AIM-1 is also used to: (1) identify a target handover (THO), (2) illuminate a location on the ground for relief on station (ROS), (3) mark a landing zone/pickup zone for utility helicopters, and (4) mark targets for ground forces. This employment technique has made big dividends in guiding a wing aircraft or ground element onto a target, and marking with the laser beam reduces the error of identifying targets in congested areas. When working with ground forces, it becomes important to mark ground targets not on the ground level, but a little higher in order to have the LOS visible for the ground element. What the AWT observes from the air at a higher elevation to the ground force may not be visible at the ground level due to other obstacles obstructing the ground-level view.

2. Ground-to-ground laser use. Most ground units employ a PAC-4 laser marking system attached to their personal weapons or a commander's pointer. These lasers are the same style as the AIM-1 in that they are used to mark targets when using NVDs. The ground element can direct movement on to a location for target identification or target acquisition to the aircrews flying in support of the ground plan.

3. Recommended techniques for use of laser. Place the "hit spot" of the AIM-1 higher on a target (i.e., third story of a house, top of a building) to allow the ground force to view the target from the ground level. This will provide them a reference point to maneuver into position on and to acquire or to search an identified objective. When city lights are intense, the use of the AIM-1 is also better identified towards the top of a building when viewed from the ground level. A key point for the "walk on" phase of employing the AIM-1 laser and having the ground force able to identify the beam is to move the beam in a zigzag or circular pattern for easier identification. This is useful to show a ground path from the ground unit to the target by moving the laser hit spot just in front of the ground element as they keep continuous movement.

Utilize positive verbiage or terms to identify movement to the ground element. Even when a laser spot is seen on a target, all references need to be in cardinal directions for ease of guidance. When giving a clock direction or a variant to a clock direction for guiding techniques to the ground forces, it is imperative to call all movements off the ground element and not the attitude of the aircraft. This is very important when calling directions in an urban environment, and can be employed by calling a direction and a certain number of houses/buildings from the ground elements position to a target location.⁴

N. Video Reconnaissance. Video reconnaissance is an important aspect of intelligence gathering. The technique described on pages 88 and 89 (Video Reconnaissance Checklist) uses AH-64 aircraft "switch" terminology; however, the basic principles apply to all aircraft with video recording capability.⁵

Video Reconnaissance Checklist

1. Actions Prior to Mission:

- Know commander's intent (why you are conducting the recon).
- Copy all friendly graphics that are in the recon area.
- Conduct a thorough map recon:
 - (1) Select ingress and egress flight routes.
 - (2) Select observation points.
 - (3) Identify LZs, known or suspected enemy locations, high-speed avenues of approach, key terrain, and potential obstacles in recon area.
- Assign primary and alternate video missions to each crew.

Technique 1:	<u>Crew</u>	<u>Primary</u>	<u>Alternate</u>
	1	LZs	Key terrain
	2	Key terrain	LZs
	3	High-speed AAs	Enemy locations
	4	Enemy location	High-speed AAs

Technique 2:	<u>Crew</u>	<u>Video Responsibility</u>
	1	LZs, enemy location, key terrain seen from OP/Rtc 1
	2	Backup for Crew 1
	3	LZs, enemy location, key terrain seen from OP/Rtc 2
	4	Backup for Crew 3

2. Actions Prior to Take-Off (Preflight):

- Ensure no entries affecting video recorder status in logbook.
- Place videotape in recorder (have backup tape available).

3. Actions in Cockpit Prior to Take-Off:

- Enter all CDU data (verify time and altitude).
- Enter video mission targets (e.g., LZs, enemy locations) into CDU.
- Ensure VID SEL switch is in PLT or CPG as desired. (Note: If in PLT, NVS must be selected.)
 - MOC video recorder.
 - Turn recorder to "REC".

4. Actions at Recon Objective:

- Ensure recorder turned to "REC".
- Push VID REC button on the ORT RHG to start recording. (Note: Ensure "recorder" message is displayed in HAD.) Expect no more than 72 minutes of recording time.
- Select TGT RPT-ON in CDU WPN page. Verbally state aircraft tail number, crew names, rank, and mission type.

Video Reconnaissance Checklist (cont)

4. Actions at Recon Objective (cont):

- If aircraft is moving, state airspeed and direction of movement on Internal Communication System (ICS).
- Slave TADS to each successive area of interest previously stored in CDU targets. Use autorange or map association to determine grid; use laser if appropriate.
- Recall each target coordinate on the screen as you slave to it with TGT RPT-ON.
- Use thumb-force controller to scan immediate area surrounding the stored target (scan in both FLIR and DTV if daytime). Try to keep the cross hairs off what you are filming.
- **TECHNIQUE: Use SALUTE format to orally describe each target on ICS or, as a minimum, use the SALT format.**
 - Observe each target in different FOVs. State which FOV is being used on ICS.
 - Ensure APR-39 volume is high enough to be audible on tape.
 - Lase and store (if appropriate) all non-planned points of interest or targets that are encountered.
 - Recall non-planned target locations on screen with TGT RPT-ON, and provide SALUTE/SALT report.
 - When recon is complete, push VID REC button to terminate recording. (Note: Ensure "RCDR OFF" message in HAD appears.)
- **BOTTOM LINE** -- The gun tape is used for both intelligence and evidence at higher levels. Be professional at all times while on the tape.

5. Actions Following Mission (Post-Flight and Debrief):

- Place mode switch to RWND, or PLAY, and then select REV or FAST to rewind.
- Once BOT is displayed in HAD, turn recorder to OFF. (Note: Tape cannot be removed if recorder is not turned off.)
- Remove tape and label with mission, crew, aircraft tail number, date, and time of recon. Include a brief written summary of the events on the tape (to include the S2's and crew's analysis) along with the tape to higher. This allows the imagery analysts at division to have first-hand accounts of what they see on the tape.

Endnotes:

1. Information derived from SWA Science and Technology Assessment Team Report, 1 May 03.
2. Information derived from SWA Science and Technology Assessment Report, 29 Apr 03.

3. Information derived from power point slide presentation, "Aviation in Close Combat," TRADOC, Aviation Doctrine collaborative site, Army Knowledge Center.
4. Information derived from Kosovo Lessons Learned, submitted by MAJ Brian Serota, 26 Mar 00.
5. Information derived from KFOR Aviation Task Force SOP, Mar 01.

CHAPTER 4

FACILITY AND BASE DEFENSE SECURITY

(Note: Information in this section was extracted from **FM 3-19.30, *Physical Security***; “10 Steps to a Better BSA Defense,” **CALL CTC Quarterly Bulletin No. 96-1** [Jan 96]; and **CALL Handbook No. 02-8, *Operation Enduring Freedom Tactics, Techniques and Procedures*** [Jun 02].)

Facility security requirements apply both in the relative security of forward operating bases and at assigned facilities within cities in a given area of operations. The expansion of threats, to include improvised explosive devices, has led to the necessity of increased vigilance and situational understanding from personnel conducting facility and base defense security operations.

A. Collective Awareness. Suggested techniques to institute security for facilities and bases include, but are not limited to, the following:

- Build bases where they can be defended, not where it is convenient.
- When barrier systems are unreliable or vehicle access controls are inadequate (or both are unavailable), use additional security measures, such as vehicles to block high-speed avenues of approach.
 - Do not use solely host nation personnel to provide perimeter security of any facility.
 - Make critical physical security improvements by installing additional barriers to screen high-risk targets.
 - Ensure that the rules of engagement (ROE) do not limit the ability of the soldier to defend himself or the facility.
 - Sensitive work areas must not be located in portions of buildings vulnerable to explosives. Living spaces should be located on the backside of buildings, away from high-speed avenues of approach.
 - Maintain the highest level of security procedures possible. Trust your own judgment when it comes to security.
 - Request military working dogs for explosive detection at gates and access control points.
 - Employ helicopters during hours of darkness; conduct random patrols along perimeters. Vary the routine of posting guards (number of personnel, time posted, methodology for posting) to disrupt the threat's decision-making cycle.

B. Personal Awareness. The single, most proactive antiterrorism security measure is individual awareness — by soldiers on guard, while moving individually near or within the cantonment area, and while operating as a unit. When combined with appropriate physical security measures, individual awareness and actions will defeat terrorist plans. The following procedures have proven effective in operations other than war where a significant terrorist threat exists:

- Look for things out of place (i.e., packages left unattended, the same car parked near the front gate for an extended period of time, or the same person standing on a street corner daily).
- Reinforce individual security awareness by reminding soldiers to report suspicious activities and out-of-place objects.
- Use tactical versus an administrative posture when moving off post as a unit or during individual travel.
- Limit the access to information about planned events, to include personnel movements and recreational activities.
- Employ security measures in unpredictable, random fashion, including security checks outside perimeters.
- Have commanders promote ROE awareness, and ensure soldiers understand the ROE.
- Impose substantial limitations on off-post travel.
- Ensure soldiers remain alert, do not establish a routine, and keep a low profile.

C. Planning Facilities and Access Control Operations (Physical Security). Leaders and soldiers at all levels should identify, at a minimum, the following areas when planning and implementing a security plan.

1. Determine authority for access and confirm identify.
2. Determine criteria for access to base and entry into buildings.
 - a. Unit personnel.
 - b. Visitors.
 - c. Maintenance personnel.
 - d. Contractor personnel.
 - e. Emergency personnel.
3. Identification and control measures for access and entry control.
 - a. Description of system used (badges, ID cards).
 - b. Application and implementation of system (see criteria for access).
4. Material control considerations.
 - a. Incoming:

(1) Determine requirements for admission of material and supplies to the base.

(2) Search and inspect material for possible sabotage hazards. (Note: Guard maintains an adequate stand-off distance while directing vehicle occupant to open compartments and doors of the vehicle under the supervision of the guard to minimize threat to soldiers.)

(3) Institute special control measures on delivery of supplies or personal shipments in restricted areas.

b. Outgoing: Determine if documentation is required.

5. Vehicle control.

a. Develop a policy for searching of military and privately owned vehicles (POVs) (to include local nationals) coming onto the base.

b. Parking regulations.

c. Controls for entrance into restricted/administrative areas:

(1) Military vehicles.

(2) POVs.

(3) Emergency vehicles.

(4) Position sterile area (inspection area) away from the majority of soldiers conducting the operation.

(5) Locate a security overwatch position for access control points.

6. Identification of additional security measures for installations/BSA.

a. Protective barriers.

(1) Definition.

(2) Clear zones.

(a) Criteria.

(b) Maintenance requirements.

(c) Identification of standoff distances for explosive devices.

(3) Signs.

(a) Types.

(b) Posting.

(4) Gates/Access Control areas.

(a) Hours of operation.

(b) Security requirements.

(c) Lock security.

(d) Barrier plans.

(e) Overwatch position identified.

(f) Determine minimum requirements for inspection of vehicles.

(g) Allow no operation of electronic devices in the area of the gates/access control point (post on signs) to mitigate against electronic initiators of IEDs.

(h) Durcuss signals should be identified for use by access guards to communicate to the overwatch elements if radio communications are unavailable.

b. Protective lighting.

(1) Use and control.

(2) Inspection.

(3) Action taken in case of commercial power failure.

(4) Action taken in case of failure of alternate power source.

c. Emergency lighting.

(1) Stationary.

(2) Portable resources.

d. Communications.

- (1) Locations.
- (2) Use and testing of communications.
- (3) Authentication procedures.
- (4) Redundant communications established.
- (5) Duress systems identified.

e. Security force operations.

- (1) Composition and organization of force (to include response force).
- (2) Essential posts and routes to/from critical sites.
- (3) Weapons and equipment needed for security force.
- (4) Specialized training requirements.
- (5) Use of MWD teams.
- (6) Method of challenging with signs/countersigns.
- (7) Communications with additional guard/security forces.
- (8) Conduct mobile patrols outside the secure area, if possible, to observe changes in civilian behavior and activities.
- (9) Vary routine with security forces and guards at main entrances.
- (10) Conduct deception operations (i.e., dummies in fighting/guard/overwatch positions or placement of security vehicles around the perimeter).
- (11) Camouflage the overwatch position.

7. Contingency planning. Required actions in response to various emergency situations. Detailed plans for situations (counterterrorism, bomb threats, hostage negotiations, natural disasters). Planning should include:

- a. Individual actions.
- b. Response force actions.

- Rehearse the echeloning of critical support assets in and out of the BSA. Exercise hasty displacement plans and routes.
- Rehearse command and control (C2) TTPs.

7. Establish and rehearse the BSA's reaction force (RF). If the company is assigned the mission of the RF, consider the following:

- Train the RF in fire and maneuvering techniques.
- Integrate MP assets into the process.
- Identify a clear chain of command.
- Ensure communications are established and frequencies/call signs for all friendly forces readily at hand (to include with coalition forces).
- Exercise the movement of the RF during defense rehearsals.
- Pre-position transportation assets if rapid road movement is required.
- Practice anti-fratricide techniques.
- Trace routes to critical areas within the base (under day/night conditions)
- Augment the RF with additional equipment as necessary: tanks, armored personnel carriers (APCs), helicopters, bulldozers, and night-vision devices.
- Identify medical support (to include medical evacuation procedures).
- Equip and train as necessary with non-lethal weapons (mission, enemy, time, terrain, troops available, and civilian considerations [METT-TC driven]).
 - * Protective shields.
 - * Protective helmets (with face shield).
 - * Protective mask (to the front to protect the groin area).
 - * Shin guards.
 - * Body vests.
 - * Protective gloves.
- Identify the requirements/authority for the release and use of non-lethal weapons in a given situation.

8. Protect critical CSS personnel. Identify those critical CSS assets within the unit's AO and measures designed to mitigate the loss of those assets.

9. Identify and brief the logistical priorities of the day. Know the logistical priorities for the given phase of the operation. Changing logistical priorities may determine a degradation or increase in the defense security plan.

10. Attend the BSA tenant meetings (as required). They are a good forum to identify shortfalls in the base defense plans.

There were 51 incidents of unauthorized personnel attempting to penetrate the perimeter of base camps during Operation Enduring Freedom — 24 were successful. The perpetrators were frequently identified and detained prior to entering the base camp. The geographic concentration of the incidents correlates with local populace needs (trying to obtain food) and existing targets of opportunity (if security does not appear to be maintained).

APPENDIX A

ABRAMS URBAN QUICK REFERENCE GUIDE (ST 3-20.12-1)*

Recent experiences indicate that urban combat will be a routine part of future operations. Urban operations differ from the traditional linear battlefield. The three-dimensional threat creates challenges for tank crews. The enemy will no longer appear to the front, but will be above, below, and behind. To defeat the enemy force and survive during urban operations, Abrams tank crews must have a thorough knowledge of their tank's capabilities, techniques for acquiring and engaging targets, and effective use of all crew-served weapons. This publication contains information pertaining to the deployment of the Abrams tank in urban operations. It addresses the rules of engagement (ROE), threat, fratricide avoidance, tank capabilities, survivability, ammunition, target acquisition, sectors of responsibility, target engagement, and training.

Rules of Engagement (ROE)

ROE must be measured to prevent fratricide and civilian casualties. Targets must be identified as threat, friendly, or civilian. Civilians will be a factor in the urban area. Crews must not overlook the possibility that they may be a threat. Crews must ensure targets are hostile before engaging.

Threat

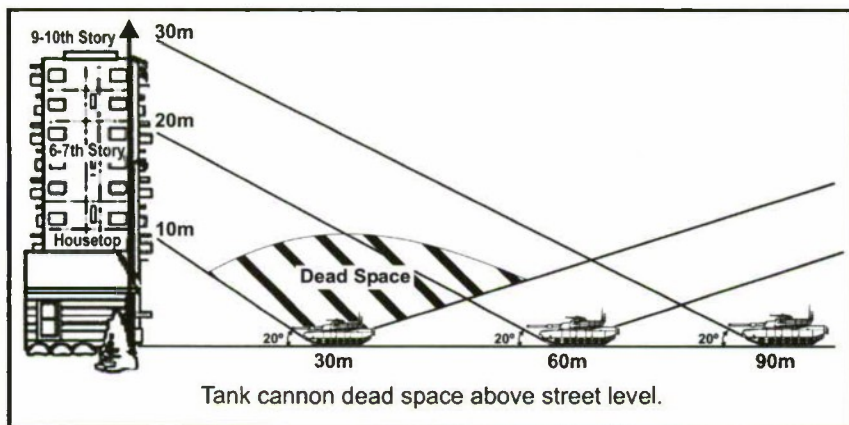
While there is still a threat of armor fighting vehicles in the urban area, crews must be aware of ATGMs, RPGs, snipers, and sappers deployed above and below the line of sight. Multiple RPGs may fire from different elevations and directions. Snipers may kill an exposed crew member from a hidden position hundreds of meters away. Sappers may approach the tank using rubble and debris and the tank's dead space to emplace explosive charges, grenades, or mines that can cripple or destroy the tank.

Fratricide Avoidance

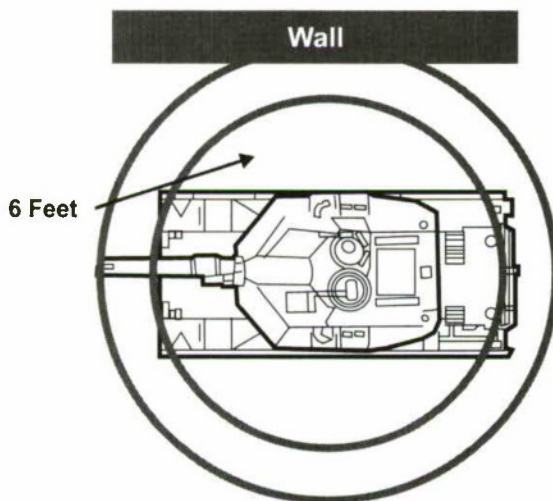
Due to the rapid movement of friendly infantry seeking covered and concealed positions, the chance of fratricide greatly increases. Communications between tank crews and infantry is critical to prevent fratricide. Man-portable radio systems must be used to keep constant contact between the tank and infantry. Recognition markings must be established. Tank crews should use the GPS in both daylight and TIS channel to observe infantry in all their gear prior to operations. TCs, loaders, and drivers should use passive systems to observe infantry.

Tank Capabilities

The tank's main gun and coax machine gun can depress to -10 degrees and elevate to +20 degrees. This creates considerable dead space for tank crews at close ranges, which are typical during urban operations. Engaging targets at rooftop level requires the crew to be at least 30 meters away to be able to elevate to rooftop level. For a target located on the 6th or 7th floor, for example, crews must be a minimum of 60 meters away from the target. Crews may back up or use rubble, vehicles, or higher elevation to allow them to elevate and engage targets. When supporting infantry, TCs should seek these positions to support with fire.



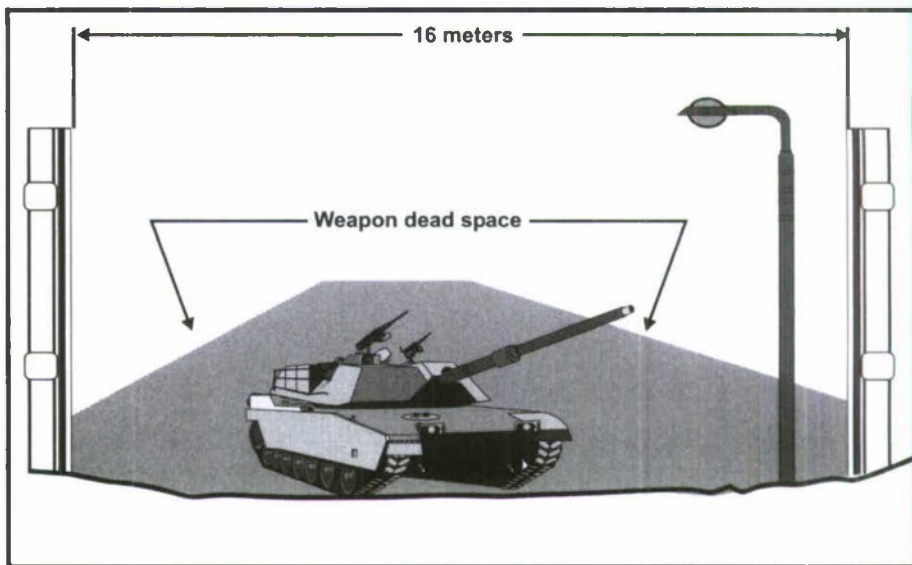
With an average street width of 16 meters in urban areas, traversing the main gun may be difficult. Crews must consider the rear of the turret as well as the muzzle end of the gun. Crews should allow 6 feet of clearance for the back of the turret; they must account for additional length if additional gear or equipment has been stowed on the stowage racks.



Survivability

To date, the Abrams tank affords the tank crew the best protection on the battlefield; however, it was not designed to fight in urban terrain. The tank crew can greatly enhance its survivability with simple techniques and procedures. The crew must identify and overcome dead space, perfect load plans, make tank modifications, and learn how to select hasty battle positions.

- **Dead Space.** Conducting operations with closed hatches creates considerable dead space where the enemy may approach and emplace explosives that may damage or destroy the Abrams tank. Most streets are 16 meters wide in urban areas. This short width creates dead space where the crew cannot observe through their vision blocks or engage with crew-served weapons. Utilizing tank sections and infantry support can greatly mitigate this by having constant observation of these areas. Tank crews must not become overdependent on infantry support to cover this dead space. Brief infantry soldiers that if they take cover in this area, they may be killed when the tank turns, pivots, or backs up.



WARNING

Dismounted soldiers may be injured or killed while in the tank's dead space.

- **Load Plans.** Tank crews should remove all gear that may catch on fire. When this is not possible, the crews must ensure the gear is secured in the bustle rack below the line of sight so it does not impair vision from the TC's vision blocks while operating closed hatch. Drivers should have extra vision blocks in the driver's compartment to replace any that become damaged. Additional water and rations should be stored in the turret.

- **Tank Modifications.** Heat shields may be constructed from sheet metal and bolted to exhaust grates to deflect the tank's heat and exhaust downward, enabling infantry to walk behind the tank. The shield may be mounted to deflect the exhaust upward; however, the exhaust will interfere with the thermal sight when engaging to the rear. Warn infantry soldiers of the extreme exhaust temperature. Infantry must keep in constant communications with the tank crew in case the tank needs to move.

WARNING

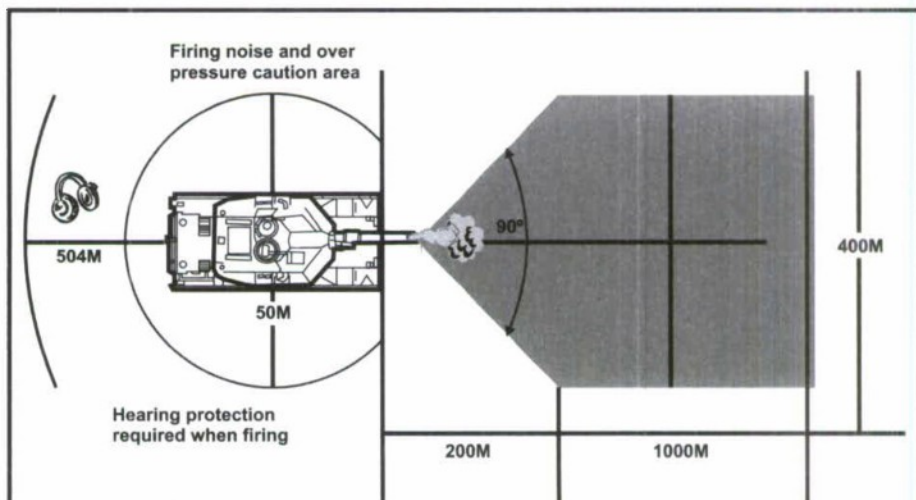
The tank's 900-degree exhaust will burn the skin if the exhaust grate or deflector shield is touched.

Spare track may be mounted to the sides of the turret to provide stand-off armor against RPGs.

- **Battle Positions.** Vehicles, rubble from buildings, and walls can be used for hasty battle positions during urban operations. Anything that can be placed between the crew member and an RPG can afford cover. It can also be used to pull up onto to gain greater elevation for the main gun and coax machine gun. Chain link fences can provide protection from RPGs and ATGMs by causing them to detonate prematurely.

Ammunition

The preferred main gun rounds during urban operations are HEAT, MPAT (ground mode), and MPAT-OR (XM908). These all perform much better than sabot rounds against bunkers and buildings. HEAT ammunition will open a larger hole in reinforced concrete or masonry structures than MPAT or MPAT-OR (XM908). Both MPAT and MPAT-OR, however, offer greater incapacitation capability inside the structure. HEAT ammunition arms approximately 60 feet from the gun muzzle. It loses most of its effectiveness against urban targets at ranges of less than 60 feet. MPAT and MPAT-OR rounds arm approximately 100 feet from the muzzle end of the gun. Because of the shape and metal components of the projectiles, however, this ammunition remains effective at ranges of less than 100 feet. Sabot petals, including those on MPAT and MPAT-OR, endanger accompanying dismounted soldiers. They create a hazard area extending 70 meters on either side of the gun-target line out to a range of 1 kilometer.



WARNING

Dismounted soldiers may be injured or killed from the overpressure and discarding sabot pedals from the 120mm cannon, falling glass, and debris created by the overpressure and rounds impacting on buildings.

Building Characteristics

The crew's ability to classify building and wall thickness will enable them to support the infantry wall-breaching efforts. This chart provides information needed to penetrate walls with main gun ammunition. In some cases, crews should fire one round of sabot to crack concrete and follow with HEAT or MPAT to shatter the wall and create a breach for infantry.

TYPE	BUILDING MATERIAL	HEIGHT (STORIES)	AVERAGE WALL THICKNESS (INCHES)
Mass	Stone	1 to 10	30
Mass	Brick	1 to 3	8 to 12
Mass	Brick	3 to 6	12 to 24
Mass	Concrete block	1 to 5	8
Mass	Concrete wall and slab	1 to 10	8 to 15
Mass	Concrete "tilt-ups"	1 to 3	7
Framed	Wood	1 to 5	6 to 8

Target Acquisition

In urban operations, the crew's ability to detect targets will be affected by friendly and enemy smoke, fire, and dust from debris. The TIS reflects off glass and prevents crews from seeing through windows; therefore, crews should alternate the daylight and thermal sight while scanning. The use of hunter-killer teams is highly encouraged — infantry, scouts, or wingmen are the hunters and the tank is the killer.

Sectors of Responsibility (M1 and M1A1)

The TC's sector of responsibility is 360 degrees using his vision blocks and the ground-to-rooftop search and scan, paying close attention to rooftops and windows.

The gunner's sector is forward from fender to fender, within the limits of the GPS in 3X magnification, using the horizontal slow-scan technique, and alternating the daylight and thermal sight.

The driver's sector is forward, between the front fenders, paying close attention to alleys, obstructions, and possible mine locations.

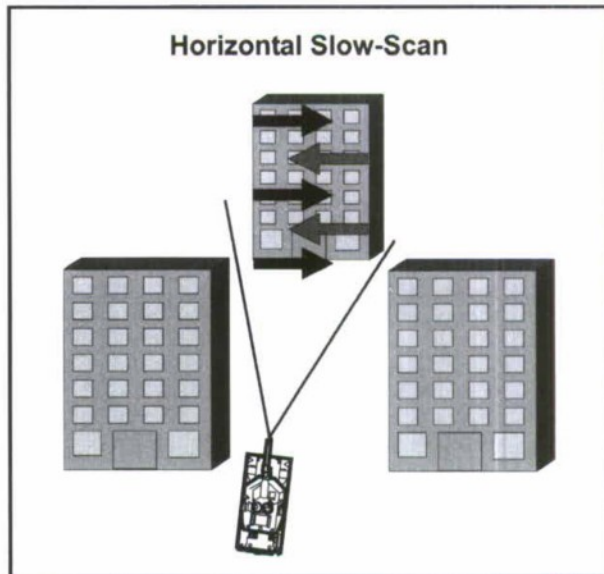
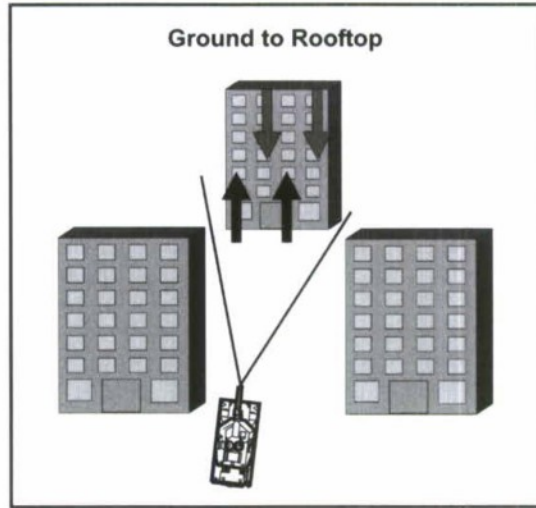
The loader orients to the left flank of the tank using the loader's vision block.

Sectors of Responsibility (M1A2 SEP)

The TC's sector has the addition of the CITV in 3X using the ground-to-rooftop technique.

The M1A2 gunner's sector is forward from fender to fender, within the limits of the GPS in 3X magnification, using horizontal slow-scan technique.

The M1A2 SEP gunner will alternate the GPS 3X and the BIOC sight.



Target Engagement

Due to the short range of targets, the possible lateral spread of fleeing targets, and the speed required to engage moving targets, gunners may engage targets in 3X from the GPS. Due to the 3X framing box (no aim point), the Abrams thermal sight does not allow engaging targets.

The fire control system cannot provide a ballistic solution for less than 200 meters for the main gun. A battle sight range of 300 meters for the main gun will enable crews to engage targets at 0 to 600 meters and provide faster engagement times.

Training

To prepare for urban operations, TCs and crews should practice the following procedures:

- Closed hatch operations.
- Scanning techniques.
- Crew drills — backing up and pivot steering while engaging targets. Reduced fire commands.
- Main gun and coax machine gun battlesight and degraded-gunnery techniques.
- Rehearsals with dismounted infantry and engineers.

* The proponent for this publication is HQ TRADOC. Submit comments for improving this publication on DA Form 2028 to Directorate of Training, Doctrine, and Combat Development, U.S. Cavalry and Armor Center, ATTN: ATZK-TDD-G, Fort Knox, KY 40121-5000. Additional information is available at (502) 624-5765.

APPENDIX B

GENERAL LOGISTICAL TTP

The following TTP are important factors to assist soldiers in properly maintaining equipment in Iraq and Afghanistan. The lessons are from the CALL database on recent operations in Iraqi Freedom and Enduring Freedom. The purpose is to keep equipment (vehicles, generators, tires, radios) combat ready so that soldiers can accomplish their missions.

A. General Maintenance Tips.

- To keep the fine sand and dust off parts while making repairs, wrap greased parts with waxed paper or newspaper.
- Lubing: Wipe off grease fittings before plugging in the grease gun. Otherwise, you may pump in sand, which will chew up the bearings and can plug up relief fittings. Keep grease cans sealed to ensure that sand is not introduced into the grease.
- Use an antifreeze solution of 60/40 or 50/50. This mix helps keep engines cool.
- Keep all air-cooled surfaces clean of oil and grease. These surfaces — parts of radiators, oil coolers, and the like — transfer heat away from the water and oil inside them as air flows past them. Oil and grease attract dust and sand like magnets. The heat cannot escape, which causes engine and transmission damage.
- Ensure fuel remains clean during refueling. Always wipe off the outside of the fuel nozzle before refueling. If there is dirt on the inside of the nozzle, flush it out or take the nozzle off and clean it. Wipe away dust and sand from the filler opening before removing the cap, and then cover the open space while the nozzle is in the opening. Ensure that you always close the fuel cap tightly after fueling.
- Fill radiators with clean water from a reliable source. Local (unapproved) water sources often contain mineral deposits that will eventually clog up radiator cores.
- Use only distilled water (if available) for filling battery cells. Check batteries daily, as the extreme heat in the desert can cause batteries to lose much of the liquid in their cells. Water from unreliable sources can add substances that prevent batteries from giving normal service.
- Cover glass surfaces when they are not being used. Scouring and etching by sand will ruin them. In addition, the build-up of dust on surfaces can degrade low-light vision. Use plastic cling film to cover optics during sand storms or until the commencement of combat operations.
- Oil should be changed twice as often as recommended, not only because grit accumulates in the oil pan, but also because uncombusted low-octane fuel seeps down the cylinder walls and dilutes the reservoir.
- Use high-temperature tape or plastic ties and spiral wraps on engines and other places in lieu of electrical tape. High temperatures kill synthetic materials, such as electrical tape, by causing them to break down chemically. Regular tape softens and unravels.
- HMMWVs have less than 1½ feet of clearance between the undercarriage and the ground. Avoid all rocks and obstacles whenever possible.
- Precision instruments, such as range finders, may require adjustment several times during the day depending on the temperature variation.
- Maintenance of engines is critical because of the strong possibility of sand or dust entering the cylinders or their moving parts when the equipment is stripped.

- It is essential to have screens for protection against flying sand (which will also provide shade for mechanics).
- Mechanics must keep tools clean and out of the direct sunlight.
- The use of high-pressure hoses may force sand and dust into seals and bearings.

B. Weapons Maintenance.

- On small arms, reduce the amount of lubrication applied to weapons. It attracts excessive amounts of sand and dust. Soldiers must clean weapons daily to ensure that they work properly.
- Cover muzzles with a protective dust cap.
- Weapons may become clogged because of dust and sand accumulation.
- Sand- or dust-clogged barrels can lead to in-bore detonation.
- Working parts of weapons must have the absolute minimum of lubrication. It may even be preferable to have them totally dry.

C. Generator Maintenance.

- Clean generator fuel and air filters daily. Replace when badly clogged, torn, or damaged.
- Reduce condensation by topping off the fuel tank at shutdown.
- Check engine oil daily. Heat causes oil to break down more quickly, and sand damages the engine. If you feel grit on the dipstick, change the oil and filter.
- Close doors and shrouds to keep the generator cool. With the doors and shrouds shut, air is funneled to the parts of the generator that need cooling. The closed doors and shrouds also keep sand out of the engine compartment.

D. Battery Maintenance.

- Batteries do not hold their charge effectively in intense heat. Heat quickly discharges the stored energy in batteries.
- Maintenance personnel and operators must adjust the battery specific gravity (SG) to the desert environment. Either adjust electrolyte to 1.2000 to 1.225 SG or obtain sulfuric acid electrolyte with an SG of 1.2085 - 1.2185.
- It may also be necessary to adjust the battery SG to compensate for cold nights.
- Batteries must be kept full but not overfilled; a reserve of distilled water should be carried.
- Air vents must be kept clean or vapors may build up pressure, causing the battery to explode.
- Voltage regulators should be set at the lower end of the specifications.
- Vehicle batteries have been found to go dead after short periods of vehicle inactivity (5 to 10 days).
- About one of every three vehicles should carry jumper cables for servicing dead batteries.

E. Filter Maintenance.

- It takes relatively little dirt to block a fuel line and compression — ignition engines depend on clean air.
- Examine and clean all air, fuel, and oil filters at frequent intervals. The exact interval depends on the operating conditions, but the frequency should be at least daily.
- Ambient air that appears clean is actually laden with fine dust, even on a clear day.
- Use filters when refueling any type of vehicle.
- Cover the gap between the nozzle and the fuel tank filler when fueling.
- Fuel filters require frequent cleaning.
- Oil filters will need replacement more frequently than usual.

F. Tire Maintenance.

- Tire wear and, consequently, tire replacement rates, increase in the desert environment.
- Recommend all vehicles carry one or preferably two spare tires.
- Increase unit prescribed load lists (PLLs) — as well as authorized stockage lists (ASLs) — for tire stocks.
- Expect a flat-tire rate of 40 percent.
- Areas of packed sand and rock shorten tire life.
- Retread tires on tactical vehicles cannot stand up to the heat and sand of a desert environment.
- The majority of flats are attributable to the wear and tear of off-road travel rather than to road heat, high temperature, dryness, potholes, or abuse.
- A sharp rock itself rarely punctures a tire outright, but over a short period of time, it weakens the tire's structure by constant wear on the tread.
- Exercise extra care in driving over terrain.

G. Vehicle Recovery Techniques.

- A vehicle can be freed from soft sand by letting out about one fourth of the air pressure of the trapped tires. Re-inflate when freed.
- "Sand ladders" are made of reinforcing rods welded to angle irons. They are about two feet long and the width of a truck tire.
- Carry an air pump or sand ladders and a shovel. If available, carry all three.
- Increase the number of tow bars, ropes, and matting in the unit, and equip all tactical wheeled vehicles with winches.
- Winching out a stuck vehicle has proven to be the most effective means of recovery.
- Another extrication procedure applicable to light vehicles stuck in very fine sand is the "rocking method." Pile sand around all four tires. Three to four men then violently rock the vehicle from side to side, forcing the vehicle to bounce as high as possible. As the vehicle's weight shifts from side to side, the piled sand will flow under the tires of the vehicle as it is rocked. Eventually, the vehicle will be raised back to the level surface.

H. Lubrication.

- Ensure lubrication is the correct viscosity for the temperature and kept to the absolute minimum in the case of exposed or semi-exposed moving parts.
- Sand mixed with oil forms an abrasive paste.
- Teflon bearings require constant inspection to ensure that the coating is not being removed.
- Lubrication fittings are critical items and should be checked frequently.

I. Pressurized System Maintenance.

- Severe heat increases pressure in closed, pressurized systems, such as the M2 fire burner unit, and increases the volume of liquids.
- Ensure that the working pressure of all equipment is within safety limits. Caution must be exercised when removing items such as filler caps.

J. Cooling System Maintenance.

- Vehicle cooling and lubrication systems are interdependent, and malfunctions by either system will rapidly place the other under severe strain.
- All types of engines are apt to overheat to some degree, leading to excessive wear and, ultimately, to leaking oil seals in the power packs.
- Be aware which vehicle types are prone to excessive overheating and ensure that extra care is applied to their maintenance.
- Temperature gauges will read between 10 to 20 degrees hotter than normal.
- Average operating temperature is 180 degrees (most vehicle gauges show 200 degrees).
- Monitor the gauge. If the temperature keeps rising, put the vehicle in neutral and rev the engine up to approximately 1,200 rpm until the gauge drops back down.
- Check oil levels to ensure that levels are what is required (too high may be as bad as too low), that seals are not leaking, and that oil consumption is not higher than normal.
- Keep radiators and airflow areas around engines clean and free of debris and other obstructions.
- Fit water-cooled engines with condensers to avoid waste as steam escapes through the overflow pipe.
- Keep cooling systems' hoses tight (a drip a second is seven gallons in 24 hours).
- DO NOT remove hood-side panels from engine compartments while the engine is running. This causes turbulence, leading to ineffective cooling.

K. Electrical Connections and Insulation Maintenance.

- Wind-blown sand and grit will damage electrical wire insulation over a period of time.
- All cables that are likely to become worn should be protected with tape before insulation becomes worn.
- Sand will also find its way into parts of items, such as the "spaghetti cord" plug, either preventing electrical contact or making it impossible to join the plug together.

- Carry a brush, such as an old toothbrush, to clean out these items before they join.
- A pencil eraser will clean antenna connections.

L. Optics Maintenance and Preservation.

- All optics are affected by blowing sand, which will gradually degrade performance because of small pitting and scratches.
- Guard against build-up of dust on optics, which may not be apparent until the low-light performance has substantially deteriorated.
- Keep optics covered with some type of plastic wrap until needed.
- Whenever possible, use the soft brush in the BII to clean optics.
- If possible, use a low-air pressure system to blow all sand out before wiping or dusting to prevent scratching of the lens.

M. Communication Equipment.

- Dust affects communication equipment (e.g., amplifiers). Dust covers should be used whenever possible.
- Some receiver-transmitters have ventilating ports and channels that can get clogged with dust. These must be checked regularly and kept clean to prevent overheating.
- All radios, regardless of type, must be kept COOL and CLEAN. They must be placed in the shade whenever possible and in a ventilated area. If water is available, lay a damp towel on top of the radios, making sure that the air vents are not blocked. Use a paintbrush to keep radios clean.
- Some radios automatically switch on their second blower fan if their temperatures rise too high, which normally only happens in temperate climates when they are transmitting.
- Amplifiers are liable to severely overheat and burn out. Such equipment should be turned on only when necessary (they do not affect receiving), as they take approximately 90 seconds to reach the operating mode.

N. Maintenance of Automation Equipment.

- Automation equipment is adversely affected in a desert environment.
- Lack of repair parts and/or float equipment will delay repairs from two to eight weeks.
- Do not expect short response replacement/turnaround of combat damaged equipment.
- A stock of repair parts, to include hard disk drives, drive controller cards, floppy drives, inter-modems, fuses, and printer parts, should be maintained down to at least the division automation office level.
- Units are required to have a three- to five-year warranty on all computers, which allow units to contact the computer vender and request a one-for-one replacement for broken computers rather than have an on-hand stockage of repair parts.
- Some items of equipment are fitted with thermal cutouts, which open circuit breakers when equipment begins to overheat.

APPENDIX C

AVIATION MAINTENANCE TTP

A. General.

- Order spare covers for aircraft windshields, engines, night system components, and ASE equipment to ensure the fleet can be protected if covers are lost.
- Do not perform lift checks (health indicator test [HIT], out-of-ground effect [OGE], and in-ground effect [IGE]) in excessively sandy areas.
- Maximum use of airborne HIT checks IAW the Operator's Manual (-10).
- When possible, park aircraft under at least a partial cover to shade and cool the section of the aircraft under maintenance.
- Mats and pads should be used to protect the knees and elbows of mechanics performing maintenance on hot metal.
- Wrap tool handles with a cord or tape to avoid burning hands.
- Schedule maintenance for early morning, late afternoon, evening, or night when the desert heat is less intense.

B. Aircraft Engine Shutdown.

- Cooling of all gas turbine engines prior to shutdown is essential.
- Not performing a two-minute cool down prior to shutdown subjects the engine(s) to excessive temperature change, which may result in warping, twisting, and, in extreme cases, cracking of engine components.

C. Washing Aircraft.

- Maintenance officers should coordinate and schedule with support units for water tank support to keep bulk water available for aircraft washing.
- When possible, aviation maintenance units should procure and maintain portable aircraft washing equipment.
- Order spare rags and water containers for aircraft washing in forward areas (austere environments).
- Potable water should be used to wash engines. Water containing excessive impurities may be harmful to engine components.

D. Engine Inlets and Exhausts.

- Engine and auxiliary power unit (APU) inlets and exhausts must be covered when the aircraft is not in operation to prevent sand and dust infiltration. (Do not remove covers until mission launch.)
- Deposits of sand and dust must be removed from intake and exhaust areas prior to each operation of engines and APUs.
- All aircraft filters must be removed and cleaned prior to flight.
- Use APU barrier filters: NSN 2945-01-328-9678 (Filter Element Air)(UH-60 aircraft).

- **TECHNIQUE** (developed and used during Operation Iraqi Freedom): Use a modified KNN filter with the AH-64D auxiliary power unit (APU) to prevent sand and dust ingestion during APU use. The KNN filter is designed for use with a spray lubricant. When wet, the filter is extremely effective in removing sand and dust particles; however, in sand and dust environments, the filters are filled to their capacity and will eventually restrict airflow. (The filter cannot be cleaned effectively without damage.) The filter can be used without the spray lubricant, allowing some sand and dust particles to penetrate the APU, but the filtration occurs at such a high level it prevents damage to the APU and extends the life of the filter. The decision to use the filter wet or dry should be based on the availability of replacement filters.¹

E. Avionics Maintenance.

- Avionics equipment suffers a high failure rate in desert operations. High temperatures and direct exposure to intense ultraviolet light (bright sun) lead to premature failure of electronic equipment.

- Protect avionics equipment from extreme heat and sunlight.
- Block sunlight from cockpit radios when aircraft are not operating. Shades that stand above and off the windows work best because they are more effective at reducing cockpit temperature, and they let electronic equipment cool as much as possible before operation.
- Open forward avionics bay doors while conducting aircraft preflight inspections to allow ambient air-cooling.
- Allow the environmental control unit (ENCU) to bring the aircraft cockpit and PAB temperatures down prior to powering systems. Do not turn on the Target Acquisition Detection System (TADS), Pilots Night-Vision System (PNVS), or IHADDS if the ECS segment light is illuminated.
- Four 1/8" diameter holes can be drilled in the right-hand ENCU floor vent duct inside the right-hand console in each cockpit to allow ENCU air to cool the bottom of the console radios.
- Stockage levels of spare parts for avionics should be increased.
- The aft avionics bay on the AH-64 may be rapidly contaminated with sand. If absolutely necessary, the cooling fan, which draws air through the louvers, can be disconnected to slow contamination.

F. Aircraft Main Rotor and Tail Rotor Maintenance.

- When possible, conduct blade taping at home station to ensure proper bonding prior to deployment. Taping blades in a sand or dust environment reduces tape bonding.
- **TECHNIQUE** (developed and used during Operation Iraqi Freedom): Apply three layers of tape instead of two layers to create a thick base that will support prolonged operations in sandy conditions.²
- Do not rely on blade painting as the only method of blade protection.
- Use aggressive tip cap painting after each flight or end of mission to protect blades.

G. Aircraft Seal Maintenance.

- Aircraft having rotor seals that prevent fluid from leaking out (mostly CH-47s) will have considerable problems with deterioration of the seals if they are not kept clean.
- Aircraft developing leaks that require changing of the seals will have to undergo maintenance. The commander or maintenance officer should, at that time, consider whether or not other seals of the same type or in the general area should be replaced. A general rule of thumb to follow is, "If you have more than one seal leaking, you can expect the others to leak in a short period of time."
- Maintenance officers should maintain a larger stock of aircraft seals when operating in sand or dust environments over extended periods.

H. Aircraft Bleed Air Systems.

- Maintenance personnel should expect air valves to fail more often in sand and dust environments.
- Maintenance officers should stock no less than three times the normal supply stock of any valve that is part of an aircraft pressurized air system.
- Pilots and crew chiefs should pay special attention to bleed air valves during pre-flight and post-flight inspections.
- **TECHNIQUE (developed and used during Operation Iraqi Freedom):** Turn heater on for 10 seconds prior to engine start to evacuate sand in the bleed air manifold.³

I. Weapons Maintenance.

- Inspect and clean aircraft weapons systems daily to prevent "gumming effect."
- **TECHNIQUE (developed and used during Operation Iraqi Freedom):** Armament personnel should consider the use of a dry Teflon lubricant (Lubricating oil, Weapons, TW-258 Catalog number TW25B-1SP11, NSN: 9150-01-439-08549) on the 30-mm cannon, 50-cal machine-gun, and M60Ds to reduce the amount of sand and dust bonding to weapon components. Ground forces use this lubricant on their weapons while operating in sand and dust environments.⁴
- **TECHNIQUE (used by units during Operation Iraqi Freedom):** Units used body bags as a field expedient method to cover aircraft wing stores. The body bag protected the weapons system from dirt and sand.⁵

J. Aviation-Related Supply Requirements.

- Small portable vacuum sweeper – something similar to a "Dust Buster," only stronger.
- Small air compressor capable of delivering 60 PSI (to blow out lines).
- Pump-up bug/weed sprayers (for washing off sand in crevices around rotor head; high pressure not required).
- Large stock of grease (for purge-lubing).
- "Bubble towels" (for use in wiping aircraft dry and removing oil and grease).
- Standard issue nylon aviator gloves (for mechanics; not heavy leather).
- "100-mph" tape.

- Paint brushes of varying shapes and sizes (work well for removing sand).
- Shrink-wrap material (for wrapping aircraft for surface shipment).

K. Aircraft Maintenance Management.

- Aviation units should expect more hardware failures of the computer-based Unit Level Logistics System-Air (ULLS-A) in a sand or dust environment (data transfer failures due to floppy disk failures).
- Units should establish and maintain a manual system for tracking aircraft maintenance forms. The system should include paper copies of DA Forms 2408-12, 2408-13, 2408-13-1 and 240813-2.
- Manual systems should be the same for both unit and intermediate-level maintenance operations.

Endnotes:

1. Information derived from observations made by MAJ Scott Chiasson, Center for Army Lessons Learned (CALL) restricted database, CONOPS, Aviation Operations, page 1.
2. Ibid. page 9.
3. Center for Army Lessons Learned (CALL) restricted database, CONOPS, Aviation Operations, page 2.
4. Ibid., page 6.
5. Information derived from SWA Science and Technology Assessment Team Report, 1 May 03.

APPENDIX D

TTP FOR HELICOPTERS IN THE DESERT

Flying in the Southwest Asia region presents a list of difficulties: extreme temperatures, sand, dust, primitive living and working conditions, and high altitudes in the region's extensive mountain ranges. The following are predominant problems experienced by aviation units during operations in desert environments.

A. Operations in Heavy Dust Conditions. When landing on soil or sand, helicopters are susceptible to "brown out" – thick clouds churned up by the rotors' downdraft that can block a pilot's vision and cause vertigo. Brown outs are a constant hazard. The following recommendations are provided to minimize the effects of operations in brown out conditions.

- Land the aircraft into the wind.
- Terminate approach to the ground. Do not hover.
- Exercise continuous crew coordination during approach and landing.
- Establish and thoroughly brief go-around procedures.
- Develop and implement dust abatement techniques:
 - * Lay gravel.
 - * MOBILMAT.
 - * XM19 matting sections to construct improved landing zones.
 - * Spray 50/50 mix of diesel FUEUMC-1 asphalt emulsifier on LZ/PZs to minimize conditions.

(Note: Matting is the preferred method.)¹

B. Weather Considerations. The combination of sand, dust, and rapid changes in weather will create severe flight conditions. Flight crews should conduct detailed planning for each mission and be prepared for rapid changes in weather. The following recommendations are provided for planning:

- Maintain current and updated weather information. Use all means of communication.
- Always be aware of the wind direction.
- Thoroughly plan and brief inadvertent instrument meteorological conditions (IMC) procedures (frequencies, fuel requirements, navigation aids, recovery airfield/sites).

C. Special Considerations and Operating Procedures. Special operating techniques that minimize sand ingestion/blade erosion include: (Note: See Appendix D of this handbook for specific aircraft maintenance procedures.)

- Avoid hovering as much as possible. Approach to touchdown.
- Stow the Target Acquisition Detection System (TADS)/Pilot Night Vision System (PNVS) for landings.
- Limit run-ups to approximately 5 minutes.

- Turn off the environmental control unit (ENCU) and ALQ-144s prior to take-offs and landings.
- Perform “blind” shutdowns (no APU) to minimize APU usage due to the number of APU failures.
- Conduct prolonged ground operations at flight idle.
- Blowing sand renders glass and acrylic surfaces unserviceable. Take all issued covers and any available material or coverings that provide shade for conducting maintenance or protect components from blowing sand and dust.
- Perform max performance take-offs when possible.
- Do not perform lift checks (health indicator test [HIT], out-of-ground effect [OGE], and in-ground effect [IGE]) in excessively sandy areas.
- Maximum use of airborne HIT checks IAW the Operator’s Manual (-10).

D. Night Operations.

1. **Night-Vision Systems:** The ANVIS 6 night-vision goggles (NVGs) greatly enhance the ability of flight crews to see at night. Flight crews should maximize scanning and use IR light sources to aide in navigation at night. METT-TC will dictate use of IR lights.

- **Low moon illumination:** With moon illumination levels at 20-30 percent or less, the terrain contrast/definition is inadequate for NVG operations for most units.
- **High moon illumination:** With moon illumination levels at 85-100 percent, the NVGs have a tendency to “white out;” that is, shut down due to the brightness.
- **Moon shadows:** With moon angles of 23 to 60 degrees and illumination levels of 30 percent or greater, coupled with the moon positioned to the front or side of the aircraft (approximately 9 o’clock-3 o’clock position), crews can pick up shadows and use the contrast for terrain definition. However, with the moon to the rear quadrants (4 o’clock-8 o’clock position), the moon shadows either cannot be picked up or are difficult to see. This causes terrain blending, making it extremely difficult to discern increases/decreases in elevation sloping, small buttes, and hills.

2. **Altitude Determination:** At altitudes below 50-80 feet, above ground level (AGL) rises in terrain elevation are difficult to identify, causing potential problems with flying into sand dunes. Maximize the use of aircraft radar altimeters. Based on the enemy situation, pilots may use the IR searchlight as an aid to enhance terrain definition.

3. Navigation:

- Maximize the use of individual and aircraft Global Position System (GPS) navigation systems to aide navigation at night.
- Incorporate direction, time, and distance navigation techniques into all planning as a manual backup.
- In addition to standard joint operations graphic (JOG) and tactical maps, use photomaps and “Atlas-type” road maps to navigate.

E. Operating at High Gross Weight. Operating fully loaded aircraft in the extreme temperatures of the desert and various elevations throughout SWA presents numerous challenges to flight crew members. The margin for error is greatly reduced when operating at or near aircraft maximum gross weight, and requires greater attention to detail with respect to power management.

- Aircrew training programs (ATP) must include continuous training on operating aircraft at high gross weight (limited power conditions).
- When possible, send instructor pilots and unit trainers to the High Altitude Army Aviation Training Site in Colorado.
- Conduct detailed performance planning IAW the aircraft operator's manual for each mission based on aircraft weight, ambient temperature, and pressure altitude. Pilots must understand and know the power requirements for each aircraft configuration. Aircraft maneuvering, OGE hovering, and power requirements are greatly reduced or limited under these conditions.
- Land the aircraft into the wind on every approach to provide the greatest margin between power required and power available.²

Endnotes:

1. Information derived from observations made by CPT Ted Leblow, Center for Army Lessons Learned (CALL) restricted database, CONOPS, Aviation Operations, page 13.

2. Ibid.

CALL PRODUCTS INFORMATION PAGE



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